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## MONTEREY, CALIFORNIA

# PHYSICAL, NUTRIENT, AND BIOLOGICAL MEASUREMENTS OF COASTAL WATERS OFF CENTRAL CALIFORNIA IN NOVEMBER 2010

by

Thomas A. Rago, Reiko Michisaki, Baldo Marinovic, and Marguerite Blum

September 2011

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<b>REPORT DOCUMENTATION PAGE</b>				<i>Form Approved OMB No. 0704-0188</i>	
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<b>1. REPORT DATE (DD-MM-YYYY)</b> 20-09-2011		<b>2. REPORT TYPE</b> Technical Report		<b>3. DATES COVERED (From - To)</b> 2-8 November 2010	
<b>4. TITLE AND SUBTITLE</b>  Physical, Nutrient, and Biological Measurements of Coastal Waters off Central California in November 2010					
<b>5a. CONTRACT NUMBER</b>					
<b>5b. GRANT NUMBER</b>					
<b>5c. PROGRAM ELEMENT NUMBER</b>					
<b>5d. PROJECT NUMBER</b>					
<b>5e. TASK NUMBER</b>					
<b>5f. WORK UNIT NUMBER</b>					
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b>  Naval Postgraduate School Monterey, CA 93943-5000			<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>  NPS-OC-11-008		
<b>9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b>  Marine Sciences Institute University of California, Santa Cruz			<b>10. SPONSOR/MONITOR'S ACRONYM(S)</b>  UCSC		
			<b>11. SPONSOR/MONITOR'S REPORT NUMBER(S)</b>		
<b>12. DISTRIBUTION / AVAILABILITY STATEMENT</b> Approved for public release; distribution is unlimited.					
<b>13. SUPPLEMENTARY NOTES</b> The views expressed in this report are those of the authors and do not reflect the official policy or position of the Department of Defense or the US Government.					
<b>14. ABSTRACT</b> The results of analyses of hydrographic, nutrient, and biological data collected in coastal ocean waters off Central California in November 2010 aboard the <i>R/V Point Sur</i> are presented in both tabular and graphical form. The cruise departed from Moss Landing, California, and proceeded offshore along CalCOFI Line 67 to station 90, thence northwestward to CalCOFI Line 60 at station 90, and finally shoreward along CalCOFI Line 60 to Drakes Bay, California. Additionally, ancillary Advanced Very High Resolution Radiometer (AVHRR) satellite imagery, Acoustic Doppler Current Profiler (ADCP), and Underway Data Acquisition System (UDAS) meteorological and surface oceanographic data are also included in this report.					
<b>15. SUBJECT TERMS</b> hydrography, physical oceanography, biological oceanography, nutrients, zooplankton, PaCOOS, CalCOFI					
<b>16. SECURITY CLASSIFICATION OF:</b> Unclassified			<b>17. LIMITATION OF ABSTRACT</b> UU	<b>18. NUMBER OF PAGES</b> 88	<b>19a. NAME OF RESPONSIBLE PERSON</b> Tarry Rago
<b>a. REPORT</b> Unclassified	<b>b. ABSTRACT</b> Unclassified	<b>c. THIS PAGE</b> Unclassified			<b>19b. TELEPHONE NUMBER (include area code)</b> 831-656-3349

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## Introduction

Following in a long tradition of hydrographic studies of the California Current system-- see, for example, Steger *et al.* (2000) and Collins *et al.* (2003)-- the data in this report were collected during the 4-8 November 2010 cruise of the Pacific Coast Ocean Observing System (PaCOOS) program aboard the *R/V Point Sur*. The PaCOOS program was organized in 2003/2004 as the NOAA west coast contribution to the national Integrated Ocean Observing System (IOOS), and is charged with “providing ocean information for the sustained use of the California Current Large Marine Ecosystem under a changing climate.”<sup>1</sup> PaCOOS cruises generally subsample the standard California Cooperative Oceanic Fisheries Investigations (CalCOFI) grid of hydrographic stations (Figure 1). This PaCOOS cruise did exactly that, sampling along CalCOFI line 67 from Moss Landing, California, to station 90 [CTD casts 2-21], then along CalCOFI line 60 from station 90 to station 50 [CTD casts 25-36], with an additional three sites sampled along the transit between CalCOFI lines 60 and 67 [CTD casts 22-24] (Figure 2). To increase the resolution of the hydrographic data and to maintain the convention of similar recent PaCOOS cruises (Rago *et al.*, 2006, 2007a, 2007b, 2007c, 2008a, 2008b, 2009, 2011), eight CTD casts were also inserted between the standard CalCOFI sites along line 67 (Figure 2). Finally, also included is a CTD cast completed over the Sur Ridge off Point Sur, California, during a mooring turn-around on 2 November 2010 [CTD cast 1] (Figure 2).

Participants on the cruise came from the Naval Postgraduate School (Physical Oceanography, Nutrient Analysis), the Monterey Bay Aquarium Research Institute (Nutrient Analysis, Primary Productivity), University of California at Santa Cruz (Zooplankton Analysis), and Stanford University (Microbiology\*). (The asterisked activity will not be discussed within this data report.)

## Standard Procedures

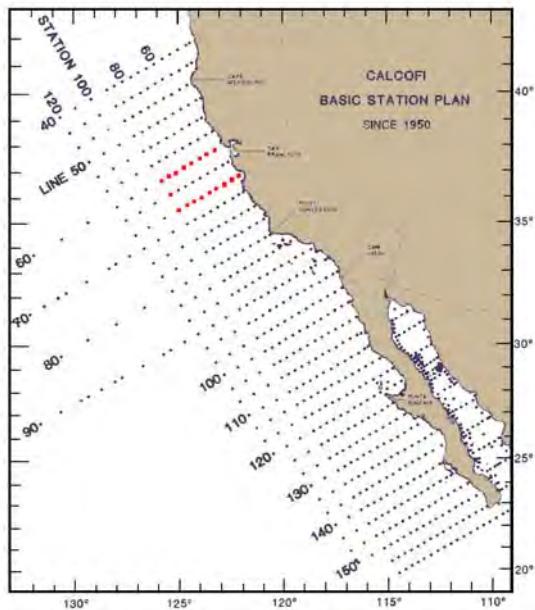
### *CTD/Rosette Data:*

At each site a Sea-Bird Electronics, Inc., Conductivity-Temperature-Depth (CTD) instrument fitted with a 12-place rosette was deployed. The rosette was equipped with 12 10-liter PVC Niskin bottles for collection of water samples. The CTD was lowered to 1000 meters or the bottom (whichever came first), except that the CTD was lowered to near the bottom at the two offshore sites at the ends of the CalCOFI lines (67-90 and 60-90). Where primary productivity sampling was performed, water samples were taken at depths designed to maximize resolution of the variables sampled throughout the thermocline. Otherwise, water samples were collected so as to aid in the later conductivity/salinity calibration of the CTD conductivity sensors. A water sample was always obtained at or near the bottom of each CTD cast for that later conductivity/salinity calibration.

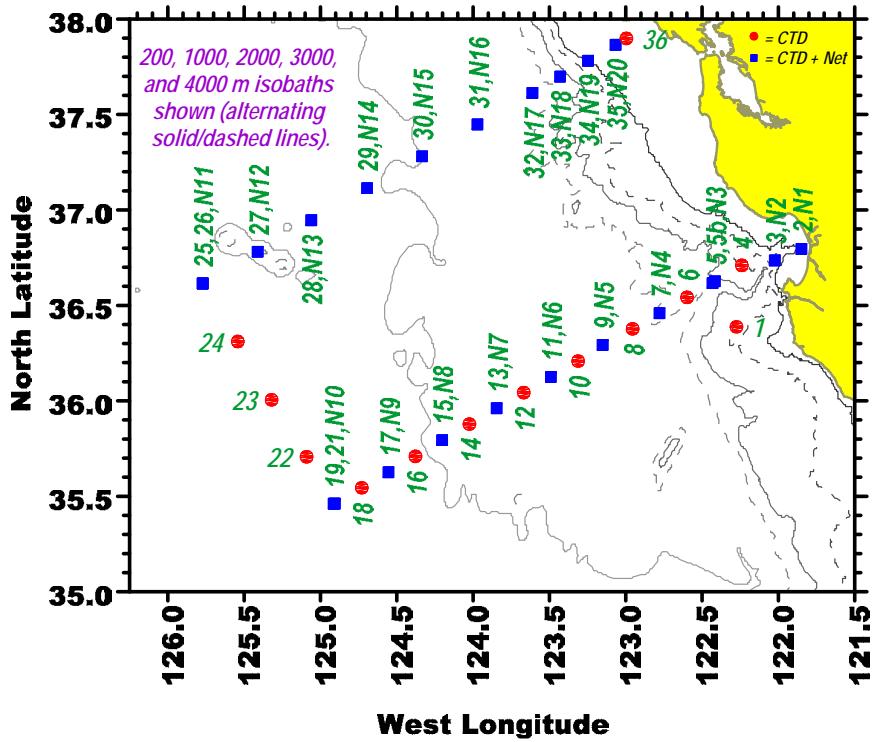
Besides temperature (dual sensors), conductivity (dual sensors), and pressure, the CTD also measured fluorescence, transmissivity, dissolved oxygen content, and photosynthetically available radiation (PAR) in the water column. Except for PAR and the secondary of the dual sensors, all these parameters are reported here.

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<sup>1</sup> <http://www.pacoos.org>



**Figure 1:** Full CalCOFI hydrographic station grid. Stations occupied during the PaCOOS cruise of November 2010 are highlighted in red.



**Figure 2:** Hydrographic stations occupied during the PaCOOS cruise of November 2010. Also shown is CTD cast 1 off Pt. Sur, California. 200, 1000, 2000, 3000, and 4000 m isobaths are shown. Net tows were completed at casts 2, 3, 5, 7, 9, 11, 13, 15, 17, 19/21, and 25/26-35.

During this particular cruise, initially there were technical difficulties using the CTD. Problems generally were manifested as high modulo error counts. The data themselves had significant spiking (for *all* the sensors), and it was often difficult to trip Niskin bottles using the Seabird software (or to be certain for that matter if bottles had tripped at all). In fact, because of the latter issue, we had to perform a second shallow CTD cast (CTD cast 5b) at CalCOFI station 67-55, since we could not be sure of the Niskin bottle trip depths during the deep cast (CTD cast 5) at that site. Although we held out for as long as we could, after completing CalCOFI line 67 (and during our transit between CalCOFI lines 67 and 60) we completely changed the CTD instrument we were using to see if that might solve our modulo error/data spiking problems. It did not. However, soon after changing CTDs, we finally traced the problems to a leak in the ship's conducting cable. After fixing that, we had no further problems. However, because we had already changed instruments (and all associated sensors), we effectively ended up with two data sets—CTD casts 1-22 and 23-36—which had to be reconciled and aligned with each other after the cruise.

Generally, a minimum of two salinity samples (including the bottom-of-cast sample) were collected from each CTD cast. These samples were analyzed after the cruise at the Naval Postgraduate School (NPS) using a Guildline model 8400B Autosal salinometer. Regressions between the salinometer results and the conductivities measured by the two CTDs at the times the Niskin bottles were tripped were made, from which corrections to the CTD salinities were determined and then applied for each CTD. The salinometer was standardized using IAPSO Standard Seawater (batch P152) before and after each set of water samples was analyzed. Salinity values were calculated using the algorithms for the Practical Salinity Scale, 1978 (UNESCO, 1981).

During this cruise we did not have available the equipment to collect dissolved oxygen (Winkler) samples. Especially since two CTDs were used, we insisted that all the CTD sensors (particularly the Sea-Bird Electronics, Inc., SBE 43 oxygen sensors<sup>2</sup>) on both CTDs be sent back for immediate post-cruise calibrations. This was done, and the data given in this report are the result of processing using the post-cruise calibrations.

For this cruise, the CTDs were fitted with SeaTech<sup>3</sup> 25-cm. transmissometers. This instrument is designed to measure beam transmission over a 25 centimeter water path using a modulated Light Emitting Diode (660 nm, in this case) and a synchronous detector. The temperature compensated transmissometer is not sensitive to ambient light. (For further details concerning the SeaTech transmissometer, the introduction from its operating manual is reprinted in Appendix C.)

Often, deck values are collected during a cruise to allow correction for instrumental drift over time with a SeaTech transmissometer. That was not done during this cruise. Instead, an alternate method was used to correct for instrumental drift. For CTD casts to at least 1000 dbars<sup>4</sup>, it was assumed that the CTD always reached effectively “clear” water. According to its operating manual, the transmissometer should measure “clear” water as 91.3% transmissivity. The maximum measured transmissivity for each cast was plotted versus cast number (representing the chronological order of the casts), and three least-squares quadratic fits were made for the appropriate  $\geq 1000$  dbars casts (Figure 3). From these fits, nominal measured transmissivity maxima were calculated for each cast, from which offsets from the nominal transmissivity of

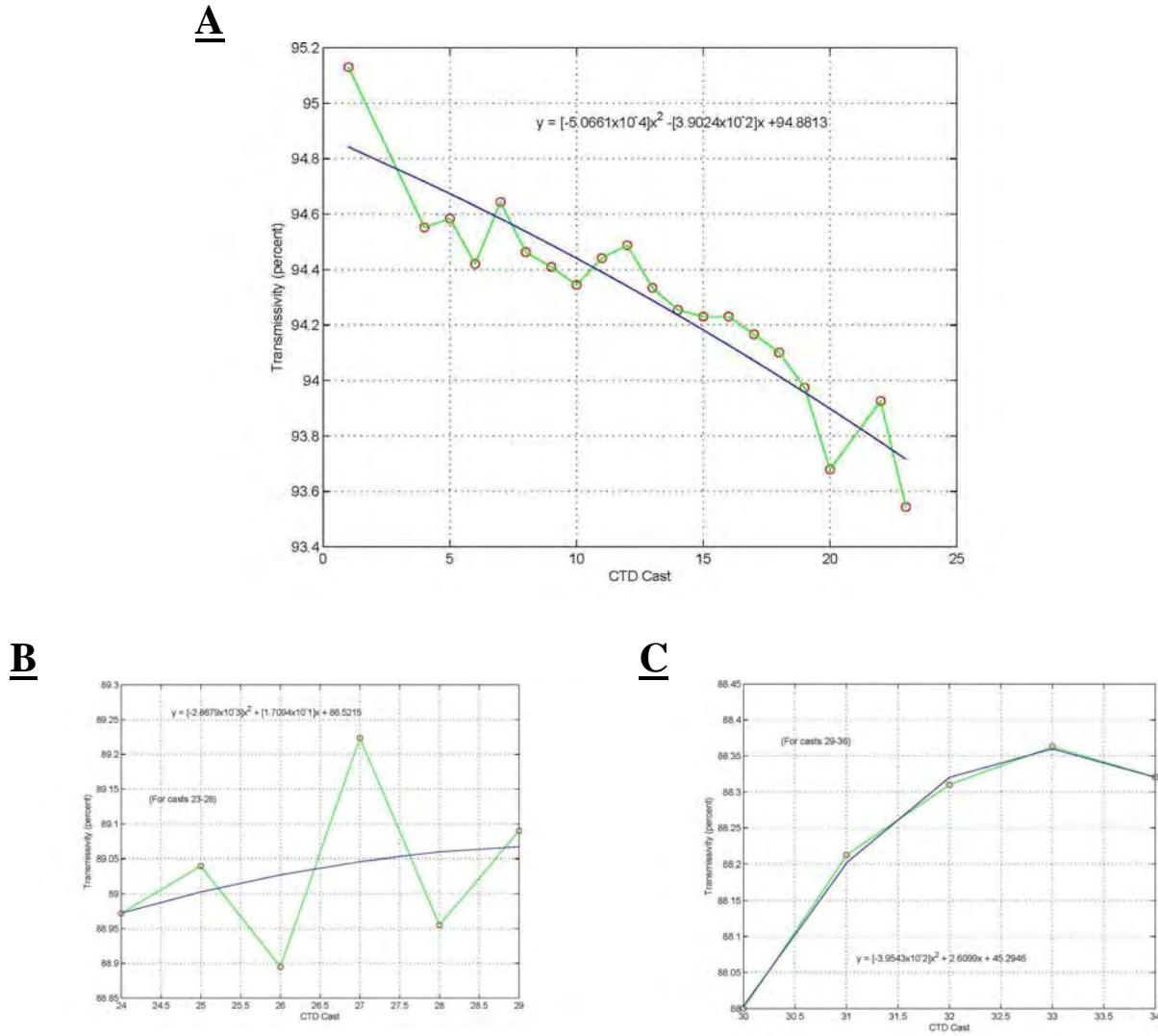
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<sup>2</sup> The SBE 43 oxygen sensor is a polarographic membrane that outputs a voltage proportional to the temperature-compensated current flow occurring when oxygen is reacted inside the membrane. Dissolved oxygen concentration is then calculated from a modified version of the algorithm by Owens and Millard (1985).

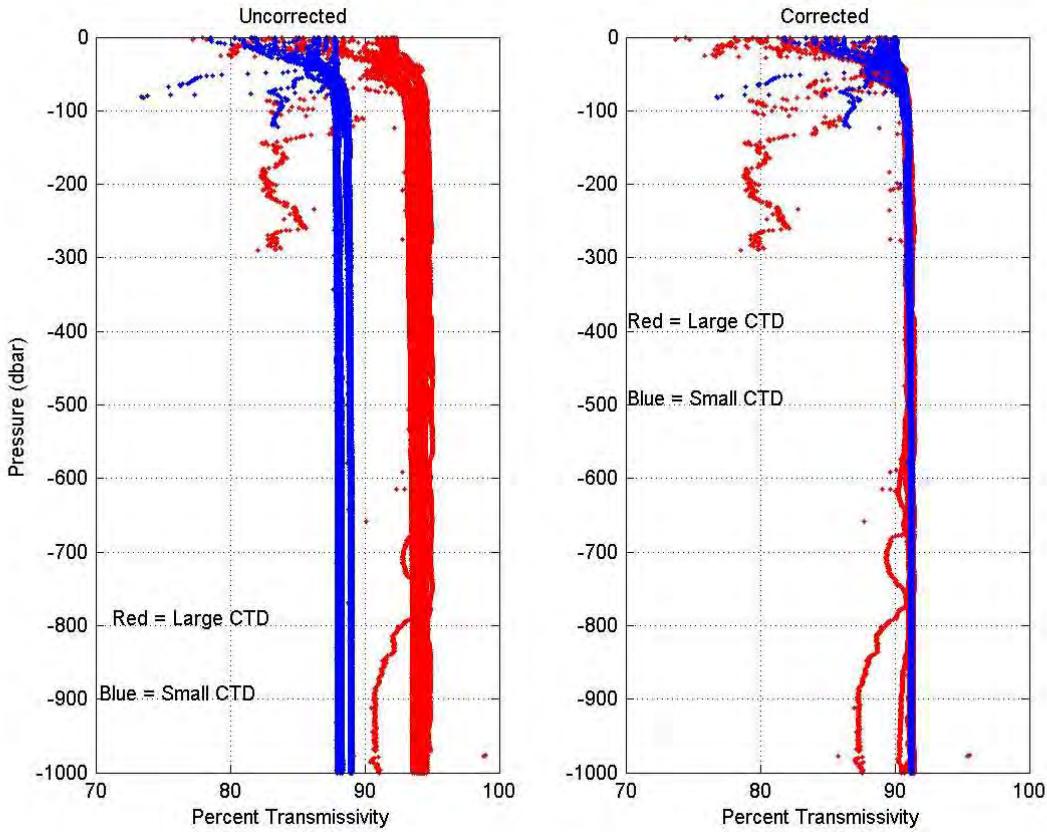
<sup>3</sup> SeaTech, Inc. was acquired by Wet Labs, Inc., in late 1998.

<sup>4</sup> The exception was the 1000-m CTD cast 3, which at 1000 dbars was sufficiently close to the bottom to experience increased turbidity from the nepheloid layer stirred up in the axis of the Monterey Canyon.

“clear” water (91.3%) were calculated for each cast (Table 1). Finally, offsets were applied to the CTD casts, giving the results shown in Figure 4.



**Figure 3:** Transmissivity maxima by CTD cast measured by the SeaTech 25-cm transmissometers during the PaCOOS cruise of November 2010. Least squares quadratic fits were applied to the data: **(A)** For the first CTD used, casts 1-22 (where cast 5b is numbered 6 and subsequent cast numbering is incremented by 1); **(B)** for the second CTD used, casts 23-28 (where cast numbering is incremented by 1); and **(C)** for the second CTD used, casts 29-36 (where cast numbering is incremented by 1).



**Figure 4:** Uncorrected (left) and corrected (right) transmissivities. This shows all the transmissivity measurements made for all CTD casts during the PaCOOS cruise of November 2010. The large CTD (red) was used for CTD casts 1-22, while the small CTD (blue) was used for CTD casts 23-36.

Nutrient samples were collected during the PaCOOS cruise in 45-ml polypropylene screw-capped containers which were rinsed three times prior to filling. Samples were frozen and returned to MBARI for later analysis on an AlpChem autoanalyzer, as in Sakamoto *et al.* (1990).

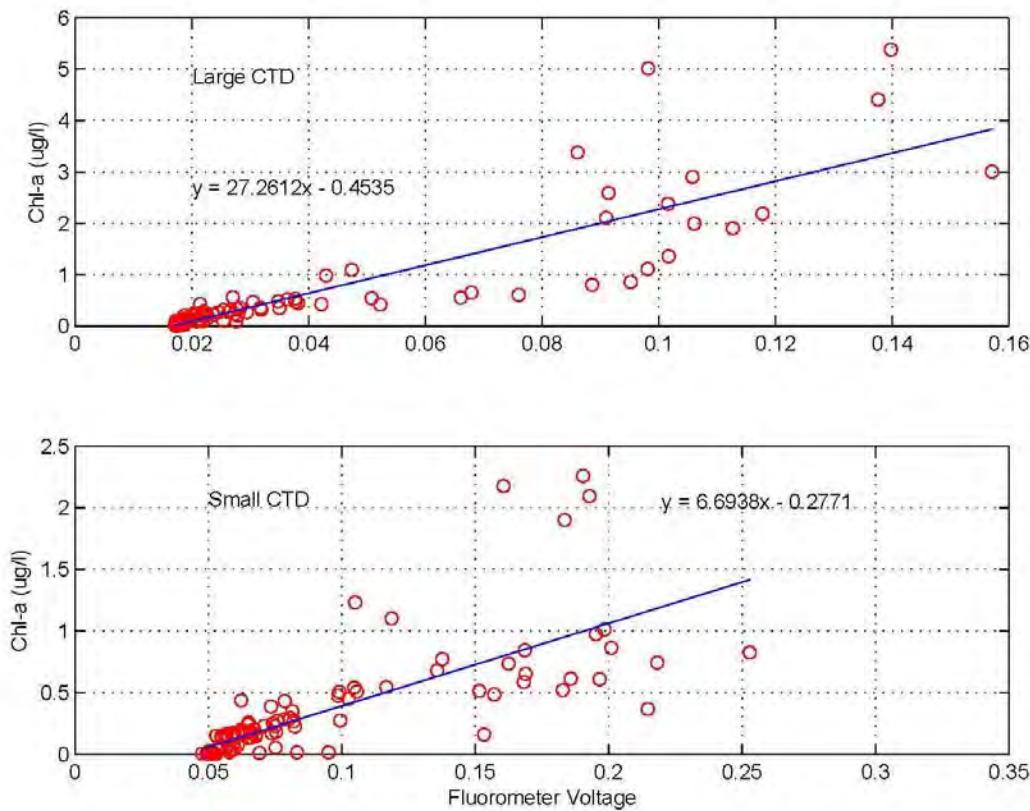
Chlorophyll-*a* and phaeopigments were collected during the PaCOOS cruise in 280-ml polyethylene bottles and filtered onto 25-mm Whatmann GF/F filters. Chlorophyll-*a* was assayed with the standard fluorometric procedure of Holm-Hansen *et al.* (1965), modified such that phaeopigments are extracted in acetone in a freezer over at least 24 hours (Venrick and Hayward, 1984; Chavez *et al.*, 1991). Analysis was performed as possible during the cruise or at MBARI immediately following the cruise.

Because two fluorometers were used during the cruise, rather than simply reporting here the instrumental output voltages, which predictably differed significantly between instruments, we converted those voltages to real-world chlorophyll-*a* concentrations. Accordingly, we performed regressions between the collected nutrient samples and the fluorometer voltages at the times those samples were collected (Figure 5). The results from these regressions were then applied to the full set of CTD fluorometer voltages to produce chlorophyll-*a* concentrations. This simple procedure

**Table 1:** Transmissivity offsets applied to each CTD cast during the PaCOOS cruise of November 2010. Different CTDs (and, hence, transmissometers) were used for casts 1-22 and casts 23-36. *a* = shallow cast (did not reach “clear” water); *b* = turbidity effects in Monterey Canyon (CTD station H3).

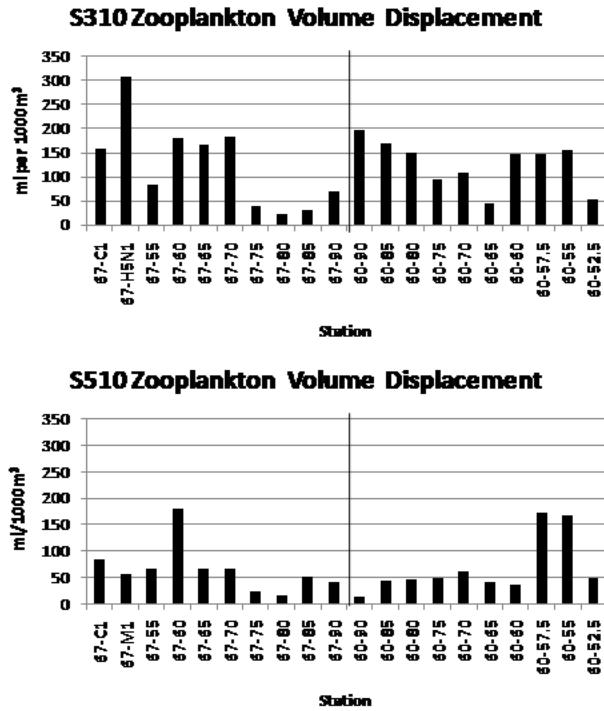
CTD Cast	Maximum Transmissivity (%) (measured by CTD)	Maximum Transmissivity (%) (predicted from line fit)	Calculated Transmissivity Offset (%) (91.3% - predicted value)
1	95.130	94.842	-3.542
2	<i>a</i>	94.801	-3.501
3	<i>b</i>	94.760	-3.460
4	94.551	94.717	-3.417
5	94.584	94.674	-3.374
5b	94.420	94.629	-3.329
6	94.643	94.583	-3.283
7	94.462	94.537	-3.237
8	94.409	94.489	-3.189
9	94.345	94.440	-3.140
10	94.440	94.391	-3.091
11	94.487	94.340	-3.040
12	94.334	94.288	-2.988
13	94.254	94.236	-2.936
14	94.230	94.182	-2.882
15	94.230	94.127	-2.827
16	94.167	94.071	-2.771
17	94.100	94.015	-2.715
18	93.974	93.957	-2.657
19	93.679	93.898	-2.598
20	<i>a</i>	93.838	-2.538
21	93.926	93.778	-2.478
22	93.544	93.716	-2.416
---	---	---	---
23	88.972	88.972	2.328
24	89.040	89.003	2.297
25	88.895	89.027	2.273
26	89.223	89.046	2.254
27	88.955	89.059	2.241
28	89.090	89.067	2.233
29	88.000	88.004	3.296
30	88.212	88.202	3.098
31	88.310	88.320	2.980
32	88.363	88.360	2.940
33	88.321	88.321	2.979
34	<i>a</i>	88.202	3.098
35	<i>a</i>	88.004	3.296
36	<i>a</i>	87.728	3.572

successfully aligned the two fluorometer output data sets (Figure 13), such that a more complicated conversion/analysis (involving differentiating between day- and night-time sampling) proved unnecessary.



**Figure 5:** *Regressions between CTD fluorometer voltage outputs and measured chlorophyll-a nutrient samples collected during the PaCOOS cruise of November 2010 for CTD casts 1-22 (top) and casts 23-36 (bottom).*

Primary productivity during the PaCOOS cruise was estimated for the 100, 50, 30, 15, 5, 1, and 0.1% light penetration depths as determined by secchi, and followed the general method of Parsons *et al.* (1984). Water samples from the appropriate depths were collected in 280-ml polycarbonate bottles, spiked with  $^{14}\text{C}$ , and incubated on deck for 24 hours under running seawater in plexiglass tubes wrapped with nickel-cadmium screens of differing pore size. (See Pennington and Chavez, 2000, for methodology details.)



**Figure 6:** Zooplankton volume displacements for Bongo net samples collected during the summer (July) [top] and autumn (November) [bottom] PaCOOS cruises of 2010 along CalCOFI lines 67 and 60. The vertical line depicts the transition from the most offshore station of CalCOFI Line 67 (90) to the most offshore station of CalCOFI Line 60 (90).

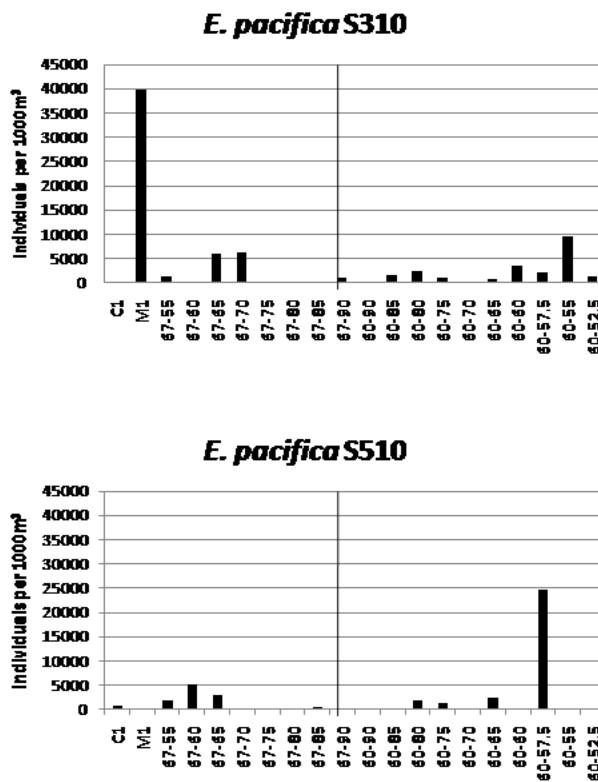
#### Zooplankton Net Tows:

Twenty stations<sup>5</sup> (Figure 2), ten along each CalCOFI line, were sampled for zooplankton abundance during the cruise. All sampling was conducted with 0.7-m diameter paired bongo nets fitted with 505-mm mesh, which were towed obliquely to a depth of 210 m (or within 10 m of the bottom, whichever came first). Samples were preserved at sea according to standard protocols (Kramer *et al.*, 1972). Compared to the previous summer (July) PaCOOS cruise (Rago *et al.* 2011), mean zooplankton displacement volume during this autumn cruise was approximately half the value it had been in July (66.88ml per 1000m<sup>3</sup> vs 125.37ml per 1000m<sup>3</sup>, respectively). Maximum values displayed a markedly inshore bias for both CalCOFI lines during the autumn compared to the more evenly distributed biomass observed during the summer (Figure 6).

<sup>5</sup> CTD stations 2, 3, 5, 7, 9, 11, 13, 15, 17, 19/21, and 25/26-35.

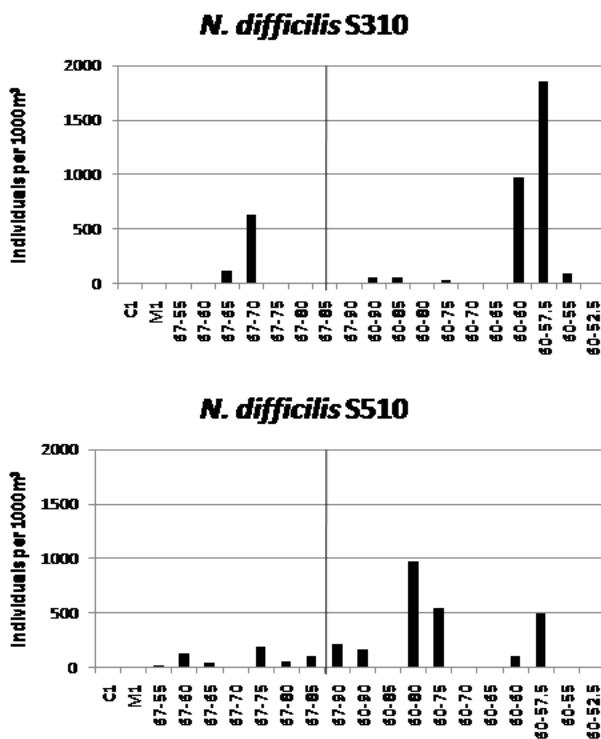
**Table 2:** Euphausiid species diversity observed during the summer (July) and autumn (November) 2010 PaCOOS cruises along CalCOFI lines 67 and 60.

July 2010	November 2010
<i>Euphausia pacifica</i>	<i>Euphausia gibboides</i>
<i>Nematobranchion flexipes</i>	<i>Euphausia pacifica</i>
<i>Nematoscelis difficilis</i>	<i>Euphausia recurva</i>
<i>Stylocheiron longicornue</i>	<i>Nematobranchion flexipes</i>
<i>Thysanoessa spinifera</i>	<i>Nematoscelis difficilis</i>
	<i>Stylocheiron longicornue</i>
	<i>Thysanoessa spinifera</i>

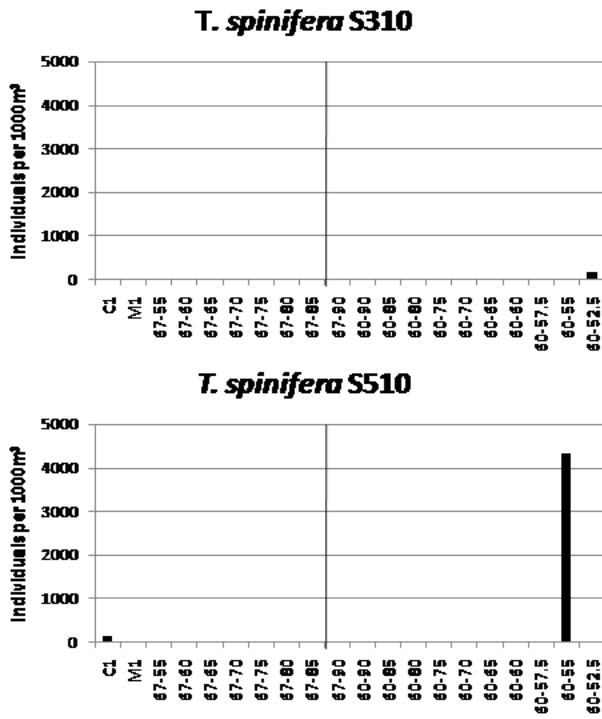


**Figure 7:** Euphausia pacifica abundance in Bongo net samples collected during the summer (July) [

A total of seven species were identified from net samples collected during this cruise along CalCOFI lines 67 and 60 compared to only five during the previous cruise in July (Table 2). *Euphausia pacifica* was the most abundant species, followed by *Nematoscelis difficilis* and *Thysanoessa spinifera*. Like the mean zooplankton displacement values, the values for *E. pacifica* displayed both an approximately 50% decrease in abundance from summer to autumn (3909.93 individuals per 1000m<sup>3</sup> to 2087.13 individuals per 1000m<sup>3</sup>, respectively) and a shift to a more inshore distribution in the autumn (Figure 7). *N. difficilis* had similar abundances during the autumn and summer cruises (153.48 individuals per 1000m<sup>3</sup> vs. 196.84 individuals per 1000m<sup>3</sup>, respectively); but, unlike *E. pacifica*, there was a decidedly more offshore distribution in the autumn compared to the somewhat more inshore distribution of the summer (Figure 8). Finally, *T. spinifera* was consistently restricted to inshore stations; it was more abundant in autumn (226.80 individuals per 1000m<sup>3</sup>) than summer (11.26 individuals per 1000m<sup>3</sup>). Of course, the observed increase was driven solely by the high abundance recorded at the single inshore station of 60-55 (Figure 9).



**Figure 8:** *Nematoscelis difficilis* abundance in Bongo net samples collected during the summer (July) [top] and autumn (November) [bottom] PaCOOS cruises of 2010 along CalCOFI lines 67 and 60. The vertical line depicts the transition from the most offshore station of CalCOFI Line 67 (90) to the most offshore station of CalCOFI Line 60 (90).

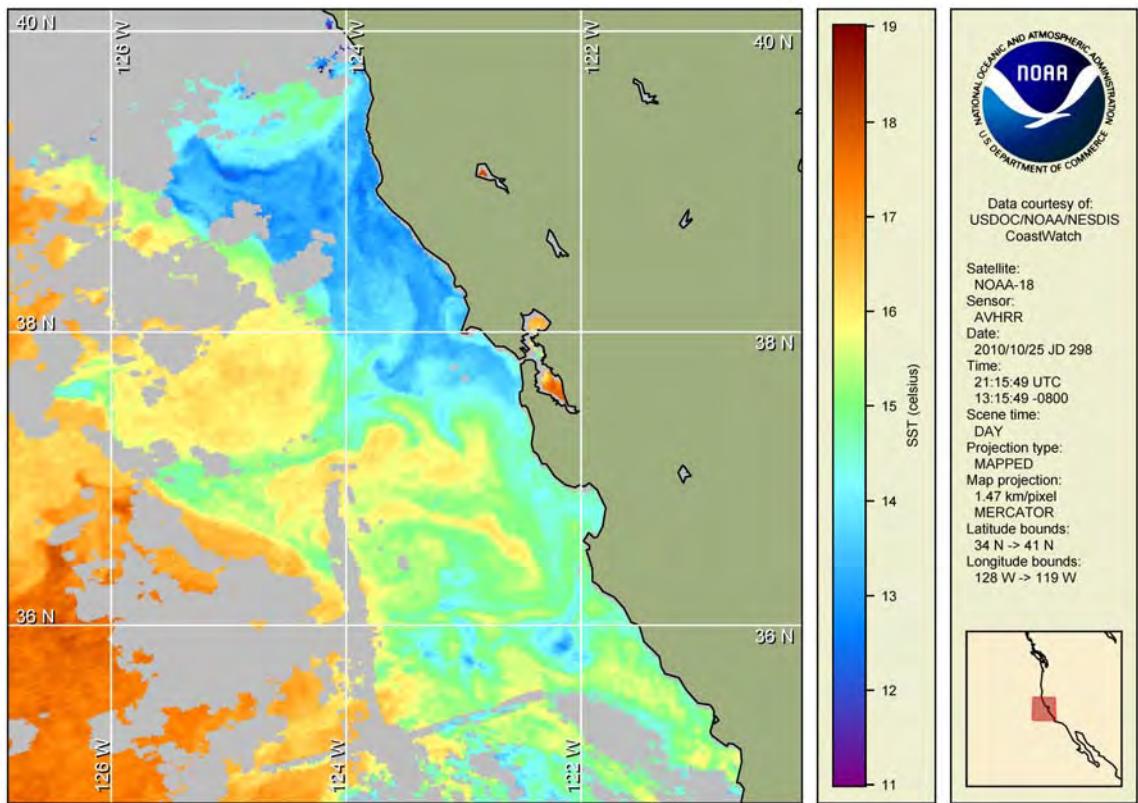


**Figure 9:** *Thysanoessa spinifera abundance in Bongo net samples collected during the summer (July) [top] and autumn (November) [bottom] PaCOOS cruises of 2010 along CalCOFI lines 67 and 60. The vertical line depicts the transition from the most offshore station of CalCOFI Line 67 (90) to the most offshore station of CalCOFI Line 60 (90).*

#### *Ancillary Observations:*

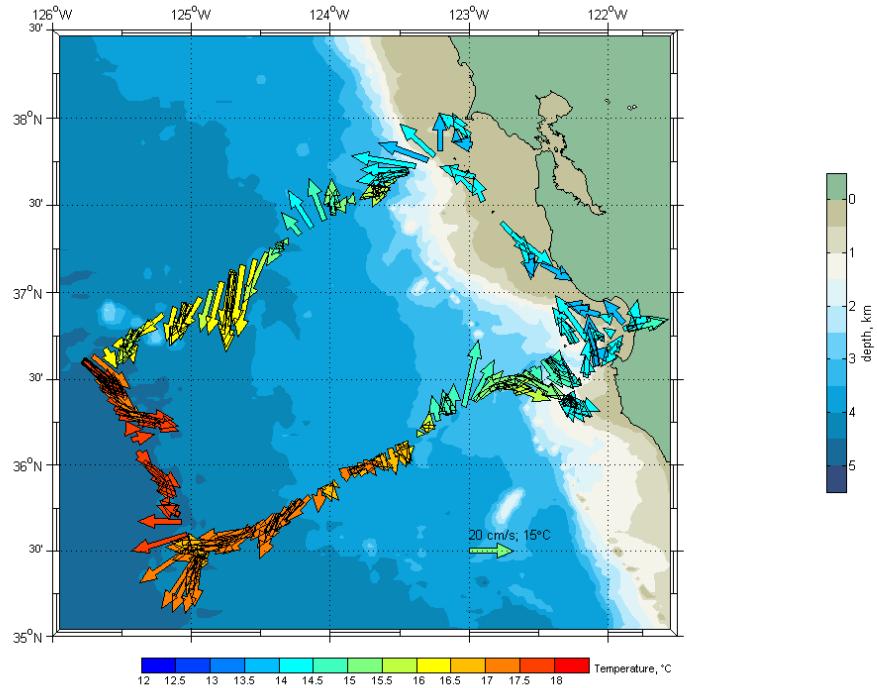
*Underway Data:* Near surface measurements of temperature and salinity were recorded throughout the cruise from water pumped through the ship's uncontaminated seawater system. These data were recorded at approximately 60-second intervals throughout the PaCOOS cruise. Table A1 lists these data at the start of each hydrographic station.

*Satellite Imagery:* Advanced Very High Resolution Radiometer (AVHRR) satellite imagery of sea surface temperature of the area of operation during the PaCOOS cruise is included as Figure 10.



**Figure 10:** Advanced Very High Resolution Radiometer (AVHRR) satellite imagery of sea surface temperature ( $^{\circ}\text{C}$ ) of the area of operation during the PaCOOS cruise of November 2010. This image was taken on 25 October 2010 at 2116 UT.

**ADCP:** Continuous ocean current measurements were made throughout the PaCOOS cruise using a vessel-mounted RD Instruments 75 kHz broadband Acoustic Doppler Current Profiler (ADCP). Some results from the ADCP are shown in Figure 11.



**Figure 11:** *Acoustic Doppler Current Profiler (ADCP) results from the PaCOOS cruise of November 2010. The arrows are current vectors for currents averaged between 50 and 100 m. The colors of the current vectors reflect the sea surface temperature as measured (nominally at 3 meters) by the ship's underway data acquisition system (UDAS).*

#### Tabulated Data (in Appendix A)

The following tables of data can be found in Appendix A:

1) Table A1: Meteorological and Sea Surface Data

This lists the meteorological and surface oceanographic conditions at the start of each hydrographic station as measured by the underway data acquisition systems of the *R/V Point Sur*.

2) Table A2: Hydrographic Data

This is a chronological listing of the hydrographic data collected at each CTD station during the PaCOOS cruise of November 2010. Data are given for standard pressures, except that the last line of data for each site is the deepest pressure for that CTD cast. The surface pressure, listed as 0 dbar, is actually 1 dbar. Salinities have been adjusted according to the conductivity/salinity calibration correction determined from the collected salinity water samples. Transmissivities have been adjusted according to the method described earlier in this report. The time listed for each station is the beginning (UT) of the CTD cast. Units of geopotential anomaly

$(\Delta\Phi)$ , potential density ( $\sigma_0$ ), and potential spiciness ( $\pi_0$ ) are  $\text{m}^2\text{s}^{-2}$ ,  $\text{kg m}^{-3}$ , and  $\text{kg m}^{-3}$ , respectively.

3) Table A3: Nutrient and Primary Productivity Data

This is a chronological listing of the results of the nutrient and primary productivity analyses of the water samples collected from the (generally) 12 Niskin bottles tripped at each hydrographic station during the PaCOOS cruise of November 2010. The time given is the start (UT) for each hydrographic station. The data for each hydrographic station are separated into up to three sections (“Physical and Chemical,” “Biological,” and “Integrated Values”).

The physical oceanographic properties listed in the first seven and the last columns of the “Physical and Chemical” section of each station’s data are the uncorrected values measured by the CTD at the times each Niskin bottle was tripped. Because they are uncorrected, these values may differ slightly from those listed in Table A2. Columns eight through eleven of this section give the nitrate ( $\text{NO}_3$ ), nitrite ( $\text{NO}_2$ ), phosphate ( $\text{PO}_4$ ), and dissolved silicate ( $\text{SiO}_4$ ) concentrations.

When included, the “Biological” section of each station’s data give the results of the nutrient and primary productivity analyses, while the “Integrated Values” section sums the nutrient and primary productivity results over the water column to the depth at which light intensity reaches 1% of its surface value.

**Figures of Results (in Appendix B)**

Graphical representations of the data collected during this cruise follow the tabulated data in Appendix A.

Figure 12 is a series of four diagrams contouring (a) the temperature ( $^{\circ}\text{C}$ ), (b) the salinity, (c) the density anomaly ( $\text{kg m}^{-3}$ ), and (d) the oxygen ( $\mu\text{mol kg}^{-1}$ ) fields along the line of hydrographic stations from Moss Landing, California, to Drakes Bay, California.

Figure 13 is a series of two diagrams that contours the fluorescence and transmissivity in the upper 100 dbars of the water column along the same line of hydrographic stations as in Figure 12 from Moss Landing to Drakes Bay, California.

Figure 14 is a series of four diagrams contouring the (a) nitrate ( $\mu\text{M}$ ), (b) nitrite ( $\mu\text{M}$ ), (c) phosphate ( $\mu\text{M}$ ), and (d) silicate ( $\mu\text{M}$ ) fields along the line of hydrographic stations from Moss Landing to Drakes Bay, California.

Figure 15 is a series of three diagrams that contours the primary productivity (upper panel), chlorophyll-a concentration (middle panel), and primary productivity index (lower panel) in the upper 50 meters of the water column along the line of hydrographic stations from Moss Landing to Drakes Bay, California. The primary productivity and primary productivity index were estimated for the 100, 50, 30, 15, 5, 1, and 0.1% light penetration depths as determined by secchi. These light penetration depths are indicated in the bottom diagram of the figure.

## Cruise Participants

<b>Scientist</b>	<b>Duties</b>	<b>Affiliation</b>
Tim Pennington	Nutrients, Primary Productivity	Monterey Bay Aquarium Research Institute
<i>Monique Messie</i>	<i>Nutrients, Primary Productivity</i>	
Marika Martin	Nutrients	
Curt Collins (Chief Sci.)	Physical Oceanography	Naval Postgraduate School
<i>Tarry Rago</i>	<i>Physical Oceanography</i>	
Keith Wyckoff	Nutrients	
<i>LT Nicola Wheatley (Royal Navy)</i>	<i>Nutrients</i>	
Baldo Marinovic	Phytoplankton Net Tows	University of California, Santa Cruz
<i>Cynthia Carrion</i>	<i>Phytoplankton Net Tows</i>	
Jason Smith	Microbiology	Stanford University
<i>Ryan Paerl</i>	<i>Microbiology</i>	
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## Appendix A

**Table A1:** *Meteorological and sea surface data collected during the PaCOOS cruise of November 2010.* Listed here are the meteorological and surface oceanographic conditions as measured by the underway data acquisition system (UDAS) of the *R/V Point Sur* at the beginning of each hydrographic station. Continuous measurements of the water being pumped through the ship's uncontaminated seawater system ("sea chest") from approximately 3 meters below the surface supplied the oceanographic data, while instrumentation atop the ship's mast supplied the meteorological data.

Station	Year/day, 2010 (UTC)	Barometric Pressure (mb)	Wind Speed (kts)	Wind Direction (°T)	SST (°C)	SSS
1	306.8132	1020.20	17.61	351.39	14.051	33.447
2	308.5986	1013.58	7.12	063.22	14.386	33.505
3	308.6889	1013.90	9.94	028.28	14.023	33.408
4	308.7896	1012.76	15.02	090.72	13.994	33.361
5	308.8785	1011.76	13.30	316.28	14.086	33.249
5b	308.9299	1011.38	10.18	327.97	14.325	33.374
6	309.0069	1011.08	7.47	004.07	14.981	33.117
7	309.0854	1011.19	5.05	244.13	15.297	33.197
8	309.1889	1011.96	5.39	316.73	14.831	33.356
9	309.2688	1012.55	11.08	270.41	14.698	33.066
10	309.3729	1012.15	10.29	343.09	15.498	32.548
11	309.4597	1011.30	6.28	349.59	16.118	32.501
12	309.5604	1011.16	4.33	344.49	16.629	32.427
13	309.6493	1012.22	4.85	312.30	16.708	32.408
14	309.7917	1012.63	1.85	131.33	16.678	32.388
15	309.8410	1011.94	5.51	175.60	16.900	32.391
16	309.9847	1010.66	5.85	159.88	16.934	32.360
17	310.0361	1010.39	6.46	138.65	16.944	32.380
18	310.1292	1010.77	7.86	179.61	16.811	32.425
19	310.2069	1011.09	4.22	161.28	16.736	32.442
21	310.2736	1010.74	5.45	182.54	16.678	32.440
22	310.5056	1011.13	8.56	336.64	17.544	32.768
23	310.6611	1012.78	9.75	298.73	17.485	32.694
24	310.7986	1014.96	9.52	317.93	17.587	32.671
25	310.9500	1014.91	9.83	288.62	17.405	32.583
26	310.9979	1014.97	12.19	268.72	17.392	32.586
27	311.2431	1015.39	14.68	212.86	15.636	32.292
28	311.3667	1013.68	20.15	216.90	15.758	32.564
29	311.5167	1015.33	14.44	323.12	16.018	32.305
30	311.6701	1015.94	12.16	257.14	14.799	32.870
31	311.8243	1015.85	6.89	290.91	14.836	32.709
32	311.9681	1015.69	8.81	301.00	15.332	32.881
33	312.1090	1016.27	14.22	319.92	14.088	33.109
34	312.1931	1016.35	15.91	321.79	13.748	33.008
35	312.2674	1016.46	13.71	328.30	13.404	33.214
36	312.3174	1016.21	17.69	327.24	13.979	33.194

**Table A2:** List at standard pressures of hydrographic data collected during the PaCOOS cruise of November 2010. Stations are in chronological order, with the last station being CTD 36 on 8 November 2010. (CTD 20 is not listed, as the package was held at the surface in order only to collect surface water samples.) For each cast, the surface pressure (listed as 0 dbar) is actually 1 dbar, while the last pressure is the deepest pressure of the cast. Salinities have been adjusted according to the calibration corrections determined from the collected salinity water samples. Transmissivities have been adjusted according to the methods outlined within the text of this report. The time listed for each station is the beginning (*<mm/dd/yyyy, hhmm>* UTC) of the CTD cast. Units of geopotential anomaly ( $\Delta\Phi$ ), potential density ( $\sigma_0$ ), and potential spiciness ( $\pi_0$ ) are  $\text{m}^2\text{s}^{-2}$ ,  $\text{kg m}^{-3}$ , and  $\text{kg m}^{-3}$ , respectively. The standard CalCOFI grid of stations runs from CTD 2 through CTD 36. (CTD 1 was collected off Point Sur, California, while redeploying a mooring.)

**Station:** 1 **Date:** 11/02/2010, 1931 **Lat.:** 36° 23.26 N **Long.:** 122° 16.45 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>0</sub>	π <sub>0</sub>
0	14.045	33.498	264.4	81.3	0.029	25.017	0.731
10	13.994	33.479	263.2	81.8	0.294	25.013	0.704
20	13.428	33.496	253.3	85.5	0.583	25.143	0.599
30	12.487	33.551	228.4	88.0	0.850	25.371	0.451
50	10.412	33.487	181.0	90.5	1.335	25.701	0.012
75	9.600	33.656	137.5	91.0	1.883	25.970	0.006
100	9.497	33.863	102.9	91.1	2.371	26.150	0.154
125	9.396	33.964	92.4	91.2	2.828	26.245	0.216
150	9.090	34.047	72.8	91.2	3.260	26.360	0.231
200	8.706	34.100	64.1	91.3	4.080	26.463	0.212
250	7.995	34.111	56.2	91.4	4.850	26.580	0.111
300	7.282	34.154	37.8	91.2	5.564	26.717	0.042
400	6.512	34.201	27.1	91.4	6.862	26.860	-0.027
500	5.880	34.273	17.0	91.4	8.033	26.998	-0.052
600	5.273	34.302	11.8	91.3	9.109	27.096	-0.104
700	4.838	34.349	10.1	91.4	10.110	27.183	-0.117
800	4.405	34.400	11.8	91.1	11.018	27.272	-0.125
900	4.194	34.420	14.2	91.3	11.873	27.312	-0.131
1000	3.929	34.448	18.6	91.3	12.695	27.362	-0.137
1015	3.903	34.450	19.0	91.3	12.815	27.366	-0.139

**Station:** 2 **Date:** 11/04/2010, 1422 **Lat.:** 36° 47.76 N **Long.:** 121° 50.94 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	14.399	33.526	315.6	74.4	0.030	24.965	0.829
10	13.648	33.515	255.0	84.2	0.290	25.113	0.660
20	13.120	33.518	207.4	87.4	0.605	25.222	0.553
30	11.999	33.612	174.9	88.2	0.861	25.512	0.405
50	11.410	33.655	146.3	88.3	1.339	25.655	0.327
75	10.711	33.724	129.3	84.1	1.904	25.835	0.253
100	10.441	33.763	110.7	80.8	2.441	25.913	0.235
125	9.967	33.846	97.3	84.1	2.950	26.059	0.219
150	9.588	33.904	87.3	80.1	3.433	26.168	0.200
200	9.487	33.919	84.5	79.7	4.360	26.197	0.195
250	8.999	33.989	69.3	81.6	5.254	26.331	0.170
290	8.353	34.067	56.9	78.6	5.924	26.493	0.130

**Station:** 3 **Date:** 11/04/2010, 1632 **Lat.:** 36° 44.12 N **Long.:** 122° 01.43 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	13.950	33.464	282.0	78.1	0.029	25.011	0.684
10	13.008	33.531	237.0	87.7	0.283	25.253	0.540
20	12.202	33.564	198.0	89.0	0.543	25.436	0.406
30	11.743	33.618	176.2	89.7	0.790	25.565	0.360
50	11.096	33.684	149.3	87.8	1.254	25.735	0.292
75	10.340	33.775	112.0	88.1	1.797	25.939	0.228
100	9.750	33.838	115.6	90.6	2.295	26.088	0.176
125	9.542	33.884	97.1	90.9	2.770	26.159	0.177
150	9.172	33.939	85.4	91.1	3.219	26.263	0.160
200	8.673	34.086	60.9	91.0	4.056	26.457	0.196
250	7.996	34.140	54.5	91.3	4.825	26.603	0.134
300	7.484	34.160	42.2	91.2	5.537	26.694	0.075
400	6.601	34.197	26.7	91.3	6.873	26.845	-0.019
500	5.853	34.249	17.7	91.1	8.071	26.983	-0.074
600	5.423	34.291	15.3	90.4	9.169	27.070	-0.094
700	4.963	34.341	14.0	89.4	10.188	27.164	-0.109
800	4.533	34.387	14.3	89.4	11.123	27.248	-0.121
900	4.179	34.421	19.6	87.3	12.001	27.314	-0.132
1000	3.814	34.457	26.9	87.6	12.808	27.380	-0.142
1014	3.805	34.457	24.1	87.6	12.917	27.382	-0.142

**Station: 4 Date: 11/04/2010, 1857 Lat.: 36° 42.58 N Long.: 122° 14.39 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	13.935	33.397	268.1	79.4	0.030	24.962	0.627
10	13.554	33.434	265.1	77.1	0.294	25.069	0.576
20	13.482	33.451	234.0	77.2	0.581	25.097	0.575
30	12.998	33.527	205.6	85.8	0.864	25.253	0.535
50	10.846	33.569	153.8	89.8	1.351	25.690	0.155
75	9.689	33.647	137.4	90.6	1.890	25.949	0.014
100	9.339	33.803	112.2	90.7	2.387	26.129	0.080
125	9.065	33.904	95.7	90.9	2.847	26.252	0.115
150	8.817	33.994	84.4	90.9	3.277	26.362	0.146
200	8.167	34.059	59.7	91.0	4.082	26.513	0.096
250	8.116	34.144	52.0	91.0	4.838	26.588	0.155
300	7.642	34.150	44.9	91.0	5.562	26.663	0.089
400	6.648	34.184	27.8	90.8	6.903	26.829	-0.023
500	5.977	34.239	17.6	91.0	8.124	26.960	-0.067
600	5.349	34.286	10.6	90.8	9.227	27.074	-0.107
700	4.880	34.351	8.2	91.1	10.220	27.181	-0.110
800	4.519	34.382	9.1	91.0	11.146	27.246	-0.126
900	4.224	34.421	12.6	90.4	12.022	27.309	-0.128
1000	3.986	34.443	16.1	90.5	12.849	27.352	-0.135
1019	3.894	34.451	17.3	90.2	13.002	27.368	-0.138

**Station: 5 Date: 11/04/2010, 2105 Lat.: 36° 37.54 N Long.: 122° 25.04 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	14.050	33.287	264.5	85.7	0.031	24.853	0.565
10	13.759	33.365	270.0	84.3	0.304	24.974	0.565
20	12.908	33.278	247.7	85.7	0.598	25.077	0.319
30	11.394	33.118	226.5	89.0	0.879	25.240	-0.104
50	10.192	33.262	203.3	90.3	1.398	25.564	-0.206
75	9.898	33.692	177.3	90.6	1.948	25.949	0.086
100	8.577	33.699	159.2	90.8	2.436	26.167	-0.124
125	8.418	33.814	145.3	90.7	2.888	26.282	-0.058
150	8.156	33.884	139.1	90.8	3.314	26.376	-0.043
200	7.563	33.967	108.4	90.9	4.111	26.529	-0.065
250	7.274	34.049	71.2	90.9	4.851	26.635	-0.042
300	6.784	34.066	56.6	91.0	5.552	26.716	-0.097
400	6.295	34.158	29.0	91.1	6.851	26.854	-0.089
500	5.796	34.230	15.8	91.1	8.039	26.975	-0.097
600	5.162	34.282	9.4	91.1	9.122	27.093	-0.131
700	4.793	34.335	7.6	91.1	10.114	27.178	-0.132
800	4.510	34.380	9.3	91.2	11.044	27.246	-0.129
900	4.230	34.422	12.6	91.2	11.915	27.310	-0.126
1000	3.969	34.444	15.6	90.7	12.737	27.355	-0.136
1032	3.884	34.453	16.8	90.7	12.993	27.370	-0.138

**Station:** 5b **Date:** 11/04/2010, 2219 **Lat.:** 36° 37.00 N **Long.:** 122° 25.88 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	14.309	33.424	273.5	80.5	0.030	24.905	0.729
10	13.990	33.451	271.4	77.9	0.300	24.992	0.681
20	12.915	33.279	250.0	86.4	0.594	25.077	0.321
30	11.003	33.125	226.8	89.7	0.872	25.316	-0.170
50	9.738	33.309	202.8	90.7	1.366	25.676	-0.246
75	9.017	33.498	176.2	90.8	1.910	25.940	-0.215
100	8.525	33.716	153.4	90.8	2.395	26.188	-0.119
125	8.232	33.827	144.4	90.9	2.836	26.320	-0.076
150	7.981	33.901	135.4	91.0	3.253	26.416	-0.055
200	7.750	34.027	93.9	91.0	4.038	26.549	0.009
206	7.713	34.028	92.5	91.1	4.128	26.555	0.005

**Station:** 6 **Date:** 11/05/2010, 0010 **Lat.:** 36° 32.53 N **Long.:** 122° 35.91 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	14.969	33.161	258.9	83.9	0.034	24.562	0.666
10	14.908	33.161	257.7	83.8	0.336	24.575	0.652
20	14.788	33.240	257.1	84.2	0.668	24.662	0.687
30	14.144	33.389	247.7	86.8	0.983	24.913	0.665
50	10.823	33.399	201.5	90.2	1.532	25.562	0.016
75	9.821	33.699	136.1	90.9	2.086	25.968	0.078
100	9.279	33.836	107.0	91.0	2.570	26.164	0.096
125	8.885	33.911	99.9	91.1	3.020	26.286	0.092
150	8.655	33.970	91.4	91.1	3.446	26.368	0.102
200	8.164	34.061	81.3	91.1	4.248	26.515	0.098
250	8.113	34.159	49.1	91.1	5.001	26.600	0.167
300	7.632	34.167	42.4	91.1	5.720	26.678	0.102
400	6.760	34.203	28.0	91.2	7.059	26.828	0.007
500	5.949	34.224	18.6	91.3	8.282	26.952	-0.082
600	5.483	34.303	9.7	91.1	9.388	27.072	-0.078
700	5.031	34.348	8.2	91.3	10.404	27.161	-0.096
800	4.423	34.374	8.4	91.3	11.335	27.250	-0.143
900	4.215	34.417	11.6	91.3	12.205	27.307	-0.132
1000	3.915	34.443	15.0	91.3	13.026	27.359	-0.143
1014	3.884	34.448	16.2	91.3	13.137	27.367	-0.141

**Station: 7 Date: 11/05/2010, 0203 Lat.: 36° 27.54 N Long.: 122° 46.70 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	15.284	33.227	256.1	84.1	0.034	24.543	0.788
10	15.052	33.248	259.4	83.4	0.337	24.611	0.753
20	14.660	33.316	256.2	84.6	0.661	24.748	0.720
30	13.033	33.517	216.8	88.5	0.952	25.239	0.534
50	11.112	33.645	161.8	90.0	1.454	25.701	0.263
75	10.201	33.789	103.8	90.7	1.998	25.973	0.214
100	9.937	33.867	91.2	90.7	2.492	26.080	0.231
125	9.626	33.945	83.1	90.8	2.964	26.193	0.239
150	9.379	33.999	78.3	90.9	3.414	26.277	0.241
200	8.920	34.078	70.0	91.0	4.265	26.412	0.228
250	8.502	34.121	60.4	90.9	5.067	26.512	0.196
300	7.832	34.125	57.5	91.0	5.821	26.616	0.097
400	6.835	34.180	31.8	91.1	7.197	26.800	-0.001
500	6.253	34.242	17.8	91.0	8.439	26.927	-0.030
600	5.421	34.275	11.1	91.2	9.561	27.057	-0.107
700	5.017	34.340	8.2	91.1	10.578	27.156	-0.104
800	4.601	34.387	9.1	91.2	11.518	27.241	-0.113
900	4.274	34.423	12.3	91.2	12.392	27.306	-0.120
1000	3.931	34.454	16.7	91.1	13.214	27.367	-0.132
1019	3.860	34.460	17.7	91.1	13.364	27.378	-0.135

**Station: 8 Date: 11/05/2010, 0432 Lat.: 36° 22.63 N Long.: 122° 57.31 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	14.815	33.366	255.2	82.2	0.032	24.753	0.794
10	14.814	33.366	254.1	82.2	0.318	24.753	0.793
20	14.556	33.331	250.7	82.8	0.637	24.782	0.709
30	14.007	33.443	213.0	86.1	0.945	24.983	0.678
50	10.822	33.692	132.8	90.5	1.436	25.790	0.248
75	10.006	33.826	97.7	90.6	1.957	26.036	0.210
100	9.737	33.888	88.5	90.8	2.441	26.130	0.213
125	9.567	33.953	76.8	90.8	2.905	26.209	0.236
150	9.306	34.018	69.4	90.9	3.350	26.303	0.244
200	9.068	34.068	63.9	91.0	4.203	26.381	0.243
250	8.559	34.112	59.9	91.0	5.017	26.496	0.197
300	7.933	34.127	48.2	91.0	5.780	26.602	0.113
400	7.093	34.192	29.8	91.0	7.183	26.775	0.044
500	6.294	34.228	19.8	91.1	8.436	26.911	-0.036
600	5.722	34.291	11.6	91.0	9.580	27.033	-0.059
700	5.071	34.337	8.3	91.0	10.622	27.148	-0.100
800	4.608	34.396	9.7	91.2	11.562	27.248	-0.105
900	4.243	34.424	12.6	91.1	12.434	27.310	-0.123
1000	4.001	34.449	16.5	91.2	13.257	27.355	-0.129
1015	3.964	34.453	17.1	91.2	13.378	27.362	-0.130

**Station:** 9 **Date:** 11/05/2010, 0627 **Lat.:** 36° 17.57 N **Long.:** 123° 08.07 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	14.680	33.354	262.1	81.8	0.032	24.772	0.755
10	14.687	33.356	262.1	81.8	0.317	24.772	0.757
20	14.610	33.467	263.1	81.4	0.627	24.875	0.827
30	13.738	33.490	246.3	84.8	0.928	25.075	0.658
50	11.840	33.557	180.5	89.9	1.463	25.500	0.330
75	10.391	33.705	128.3	90.7	2.040	25.876	0.181
100	9.638	33.760	120.4	90.8	2.556	26.046	0.095
125	9.060	33.852	125.1	90.9	3.025	26.212	0.073
150	9.023	33.981	109.9	90.9	3.466	26.319	0.169
200	8.223	34.015	91.7	90.9	4.292	26.470	0.070
250	7.881	34.090	82.5	91.0	5.058	26.580	0.077
300	7.622	34.161	46.9	91.0	5.782	26.674	0.095
400	6.733	34.197	27.9	91.0	7.120	26.828	-0.001
500	5.957	34.242	16.8	91.1	8.333	26.965	-0.067
600	5.330	34.269	11.1	91.1	9.440	27.063	-0.123
700	4.979	34.343	8.1	91.2	10.458	27.163	-0.106
800	4.540	34.375	8.4	91.2	11.402	27.238	-0.130
900	4.252	34.419	11.8	91.0	12.277	27.305	-0.126
1000	3.934	34.441	14.3	91.2	13.104	27.356	-0.142
1014	3.875	34.443	14.7	91.2	13.216	27.364	-0.147

**Station:** 10 **Date:** 11/05/2010, 0857 **Lat.:** 36° 12.49 N **Long.:** 123° 18.73 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	15.496	32.832	250.3	85.3	0.037	24.193	0.524
10	15.497	32.832	253.3	85.3	0.372	24.193	0.524
20	15.406	32.854	255.7	85.4	0.743	24.230	0.520
30	13.064	32.901	257.0	89.1	1.087	24.755	0.051
50	11.436	33.033	231.6	90.3	1.678	25.167	-0.164
75	10.043	33.252	213.1	90.8	2.321	25.582	-0.240
100	9.059	33.443	179.8	91.0	2.886	25.891	-0.252
125	8.671	33.632	150.5	91.0	3.384	26.100	-0.163
150	8.334	33.790	149.2	91.0	3.846	26.276	-0.091
200	8.225	34.012	76.8	91.0	4.679	26.467	0.068
250	7.665	34.069	64.1	91.1	5.444	26.596	0.030
300	7.160	34.089	46.0	91.2	6.161	26.683	-0.027
400	6.469	34.147	29.6	91.2	7.490	26.823	-0.075
500	5.657	34.180	20.8	91.3	8.707	26.952	-0.153
600	5.330	34.285	9.6	91.3	9.809	27.076	-0.110
700	5.003	34.352	7.9	91.3	10.820	27.168	-0.095
800	4.526	34.392	8.8	91.3	11.749	27.253	-0.118
900	4.253	34.430	12.8	91.3	12.616	27.314	-0.117
1000	3.953	34.458	17.4	91.3	13.434	27.368	-0.127
1018	3.909	34.461	18.2	91.3	13.577	27.374	-0.129

**Station: 11 Date: 11/05/2010, 1102 Lat.: 36° 07.51 N Long.: 123° 29.42 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	16.129	32.802	247.6	87.9	0.039	24.028	0.647
10	15.861	32.825	250.4	87.1	0.386	24.107	0.603
20	15.629	32.848	252.6	87.0	0.762	24.177	0.567
30	15.441	32.862	253.7	87.5	1.133	24.229	0.535
50	13.645	32.943	256.4	89.2	1.835	24.746	0.280
75	11.263	33.018	235.8	90.4	2.573	25.187	-0.208
100	9.815	33.294	210.7	90.9	3.214	25.653	-0.246
125	8.933	33.497	183.9	91.0	3.763	25.954	-0.230
150	8.568	33.676	160.2	91.1	4.251	26.151	-0.145
200	7.898	33.903	137.2	91.1	5.123	26.430	-0.067
250	7.109	33.958	119.9	91.2	5.893	26.586	-0.137
300	6.894	34.046	67.6	91.2	6.609	26.686	-0.097
400	5.920	34.076	45.4	91.3	7.929	26.837	-0.202
500	5.827	34.236	18.1	91.3	9.123	26.976	-0.088
600	5.290	34.295	9.7	91.3	10.216	27.088	-0.107
700	4.825	34.337	7.9	91.4	11.211	27.176	-0.127
800	4.426	34.392	9.2	91.4	12.130	27.264	-0.129
900	4.119	34.428	12.7	91.4	12.984	27.325	-0.133
1000	3.859	34.450	15.8	91.4	13.793	27.370	-0.143
1013	3.844	34.456	17.6	91.4	13.895	27.377	-0.139

**Station: 12 Date: 11/05/2010, 1327 Lat.: 36° 02.58 N Long.: 123° 40.10 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	16.623	32.704	244.4	89.0	0.041	23.840	0.686
10	16.615	32.724	243.9	89.0	0.405	23.858	0.700
20	16.515	32.735	243.6	88.8	0.808	23.890	0.684
30	15.699	32.801	252.9	87.8	1.197	24.125	0.545
50	13.459	32.782	256.8	89.6	1.895	24.594	0.046
75	11.008	32.826	254.2	90.6	2.660	25.083	-0.409
100	10.339	33.143	225.7	90.8	3.334	25.447	-0.276
125	9.579	33.406	186.4	90.8	3.925	25.780	-0.196
150	8.882	33.623	158.7	90.9	4.448	26.061	-0.138
200	8.130	33.903	144.5	91.0	5.348	26.396	-0.033
250	7.494	33.947	123.3	91.0	6.143	26.524	-0.091
300	6.763	33.980	92.0	91.1	6.882	26.651	-0.168
400	5.842	34.044	51.2	91.2	8.224	26.821	-0.237
500	5.485	34.183	19.8	91.2	9.419	26.975	-0.171
600	4.850	34.239	12.9	91.3	10.495	27.095	-0.201
700	4.556	34.318	7.9	91.3	11.477	27.190	-0.172
800	4.255	34.364	8.5	91.3	12.386	27.260	-0.168
900	4.011	34.416	12.2	91.3	13.240	27.327	-0.153
1000	3.809	34.456	18.1	91.3	14.038	27.380	-0.143
1015	3.760	34.458	18.8	91.3	14.155	27.387	-0.146

**Station: 13 Date: 11/05/2010, 1535 Lat.: 35° 57.64 N Long.: 123° 50.75 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	16.703	32.679	243.4	89.3	0.041	23.803	0.685
10	16.704	32.682	243.1	89.3	0.409	23.805	0.688
20	16.706	32.682	243.3	89.3	0.818	23.805	0.688
30	16.693	32.784	243.3	89.1	1.226	23.886	0.765
50	14.713	32.779	251.5	89.1	1.994	24.323	0.304
75	11.243	32.796	263.3	90.4	2.809	25.018	-0.390
100	10.143	32.999	239.6	90.8	3.507	25.367	-0.426
125	9.758	33.313	204.3	90.8	4.129	25.677	-0.241
150	9.055	33.527	173.7	90.9	4.676	25.959	-0.187
200	8.018	33.861	146.4	91.0	5.600	26.380	-0.083
250	7.347	33.962	124.3	91.0	6.392	26.556	-0.101
300	6.983	34.014	87.4	91.1	7.128	26.648	-0.110
400	5.950	34.042	51.3	91.1	8.481	26.807	-0.225
500	5.411	34.146	25.7	91.2	9.702	26.955	-0.209
600	4.921	34.213	14.5	91.2	10.807	27.066	-0.214
700	4.619	34.295	8.4	91.3	11.811	27.165	-0.183
800	4.336	34.356	8.5	91.3	12.743	27.245	-0.166
900	4.171	34.415	11.7	91.2	13.611	27.310	-0.138
1000	3.915	34.452	16.9	91.3	14.428	27.367	-0.135
1013	3.878	34.456	17.6	91.3	14.531	27.374	-0.136

**Station: 14 Date: 11/05/2010, 1806 Lat.: 35° 52.69 N Long.: 124° 01.41 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	16.632	32.663	244.5	89.3	0.041	23.807	0.656
10	16.605	32.663	244.8	89.1	0.408	23.813	0.649
20	16.596	32.664	245.3	89.1	0.816	23.817	0.647
30	16.761	32.772	244.1	89.1	1.222	23.862	0.772
50	15.229	32.764	252.9	88.3	2.008	24.201	0.408
75	11.833	32.802	258.6	90.3	2.853	24.915	-0.274
100	10.206	32.974	237.6	90.8	3.563	25.338	-0.434
125	9.806	33.289	208.8	90.9	4.191	25.651	-0.252
150	8.876	33.508	178.0	90.9	4.742	25.972	-0.230
200	8.158	33.836	151.2	91.0	5.670	26.339	-0.082
250	7.726	33.977	122.5	91.0	6.476	26.514	-0.035
300	7.154	34.013	92.1	91.0	7.227	26.624	-0.088
400	5.995	34.033	59.6	91.2	8.605	26.793	-0.227
500	5.369	34.144	28.2	91.2	9.825	26.958	-0.216
600	4.900	34.217	15.9	91.3	10.922	27.071	-0.213
700	4.545	34.296	9.5	91.3	11.926	27.174	-0.190
800	4.244	34.368	9.5	91.3	12.841	27.264	-0.167
900	4.054	34.428	13.7	91.3	13.689	27.332	-0.140
1000	3.848	34.463	19.2	91.3	14.487	27.382	-0.133
1018	3.799	34.467	20.1	91.3	14.626	27.390	-0.135

**Station: 15 Date: 11/05/2010, 2011 Lat.: 35° 47.62 N Long.: 124° 12.10 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	16.813	32.672	244.2	89.2	0.041	23.772	0.706
10	16.730	32.668	244.3	89.1	0.411	23.789	0.683
20	16.712	32.668	244.1	89.1	0.821	23.793	0.678
30	16.689	32.667	243.7	89.0	1.232	23.798	0.671
50	14.017	32.746	260.3	88.5	1.998	24.444	0.126
75	10.933	32.848	247.2	90.8	2.770	25.114	-0.405
100	10.378	33.053	220.0	91.0	3.459	25.370	-0.342
125	9.392	33.326	191.1	91.0	4.063	25.747	-0.292
150	8.664	33.623	162.7	91.0	4.589	26.094	-0.173
200	8.029	33.906	144.5	91.0	5.472	26.413	-0.045
250	7.449	33.992	101.2	91.1	6.251	26.566	-0.062
300	6.940	34.036	72.6	91.1	6.978	26.672	-0.099
400	5.978	34.096	38.4	91.2	8.304	26.846	-0.179
500	5.472	34.174	20.0	91.3	9.499	26.970	-0.180
600	4.926	34.217	13.8	91.3	10.593	27.069	-0.210
700	4.586	34.292	8.5	91.4	11.599	27.166	-0.189
800	4.300	34.359	8.6	91.4	12.526	27.251	-0.168
900	4.055	34.416	12.6	91.4	13.383	27.323	-0.149
1000	3.850	34.459	18.2	91.4	14.186	27.379	-0.136
1016	3.805	34.463	19.1	91.3	14.310	27.387	-0.138

**Station: 16 Date: 11/05/2010, 2338 Lat.: 35° 42.70 N Long.: 124° 23.70 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	16.881	32.642	243.4	89.4	0.042	23.733	0.699
10	16.758	32.638	241.6	88.9	0.415	23.759	0.666
20	16.614	32.654	240.2	88.8	0.825	23.805	0.644
30	16.583	32.694	243.6	88.5	1.232	23.843	0.668
50	16.137	32.770	250.2	88.3	2.032	24.004	0.622
75	12.299	32.897	258.3	90.4	2.881	24.902	-0.107
100	10.827	32.918	240.7	90.9	3.603	25.187	-0.369
125	9.663	33.287	205.8	91.0	4.246	25.673	-0.278
150	8.841	33.503	176.4	91.0	4.790	25.973	-0.240
200	8.111	33.905	145.9	91.0	5.699	26.401	-0.034
250	7.587	33.992	106.2	91.1	6.489	26.545	-0.043
300	7.021	34.028	80.5	91.1	7.225	26.654	-0.095
400	6.172	34.074	42.3	91.2	8.577	26.804	-0.171
500	5.591	34.170	21.9	91.3	9.793	26.952	-0.169
600	4.961	34.222	13.7	91.3	10.899	27.068	-0.202
700	4.621	34.283	8.5	91.3	11.910	27.156	-0.192
800	4.351	34.367	8.3	91.4	12.840	27.252	-0.156
900	4.086	34.430	13.9	91.3	13.697	27.331	-0.135
1000	3.874	34.464	18.7	91.3	14.497	27.381	-0.130
1019	3.820	34.465	19.2	91.4	14.644	27.387	-0.135

**Station: 17 Date: 11/06/2010, 0052 Lat.: 35° 37.55 N Long.: 124° 33.24 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	16.947	32.674	240.4	89.4	0.041	23.742	0.740
10	16.962	32.698	242.8	89.4	0.414	23.758	0.763
20	16.964	32.712	243.0	89.4	0.827	23.768	0.774
30	16.995	32.725	242.3	89.5	1.240	23.771	0.791
50	14.245	32.791	260.2	88.8	2.024	24.431	0.211
75	11.522	32.860	253.3	90.7	2.818	25.017	-0.287
100	11.094	33.031	238.7	90.9	3.535	25.228	-0.230
125	9.527	33.236	205.3	91.0	4.169	25.655	-0.341
150	8.819	33.545	176.2	91.0	4.707	26.010	-0.210
200	8.161	33.905	143.4	91.0	5.601	26.393	-0.026
250	7.632	33.988	113.2	91.1	6.393	26.536	-0.039
300	6.942	33.996	94.1	91.1	7.134	26.640	-0.130
400	6.120	34.069	49.7	91.2	8.497	26.806	-0.182
500	5.580	34.163	27.5	91.2	9.719	26.949	-0.175
600	4.897	34.217	16.3	91.3	10.820	27.071	-0.214
700	4.612	34.309	8.9	91.2	11.817	27.177	-0.173
800	4.344	34.370	9.1	91.3	12.736	27.256	-0.154
900	4.082	34.420	12.4	91.3	13.591	27.323	-0.143
1000	3.816	34.451	16.5	91.4	14.397	27.376	-0.146
1014	3.770	34.454	16.6	91.4	14.506	27.383	-0.148

**Station: 18 Date: 11/06/2010, 0306 Lat.: 35° 32.68 N Long.: 124° 43.76 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	16.791	32.656	242.9	89.0	0.041	23.765	0.688
10	16.788	32.660	243.9	88.9	0.413	23.769	0.691
20	16.764	32.664	243.2	88.8	0.825	23.778	0.687
30	16.768	32.680	242.7	88.9	1.236	23.790	0.701
50	14.630	32.736	258.7	88.4	2.031	24.307	0.251
75	11.911	32.875	251.4	90.6	2.837	24.957	-0.200
100	10.999	33.097	228.1	90.9	3.546	25.296	-0.194
125	9.622	33.241	208.0	90.9	4.177	25.643	-0.321
150	8.793	33.539	165.6	90.9	4.723	26.009	-0.218
200	8.118	33.911	133.6	91.0	5.630	26.404	-0.028
250	7.501	33.997	102.1	91.1	6.415	26.562	-0.051
300	6.689	34.004	83.7	91.1	7.138	26.680	-0.158
400	6.088	34.134	30.7	91.2	8.451	26.862	-0.135
500	5.227	34.161	24.7	91.2	9.629	26.989	-0.219
600	5.116	34.280	10.0	91.2	10.701	27.097	-0.138
700	4.639	34.328	7.4	91.3	11.688	27.190	-0.155
800	4.289	34.379	8.2	91.3	12.597	27.268	-0.153
900	4.075	34.418	11.9	91.3	13.448	27.323	-0.145
1000	3.833	34.455	17.3	91.3	14.253	27.378	-0.141
1013	3.802	34.458	17.6	91.3	14.354	27.383	-0.142

**Station: 19 Date: 11/06/2010, 0458 Lat.: 35° 27.69 N Long.: 124° 54.35 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	16.720	32.652	245.3	89.0	0.041	23.778	0.668
10	16.677	32.663	245.5	88.9	0.411	23.797	0.667
20	16.777	32.702	244.5	89.0	0.820	23.804	0.721
30	16.792	32.710	243.7	89.2	1.230	23.807	0.730
50	14.261	32.836	261.5	89.5	2.019	24.462	0.251
75	11.860	32.884	252.1	90.6	2.814	24.974	-0.203
100	10.787	32.980	238.5	90.9	3.530	25.242	-0.327
125	9.869	33.203	212.9	91.0	4.172	25.573	-0.310
150	8.865	33.487	177.9	91.0	4.724	25.957	-0.249
200	8.330	33.869	142.4	91.0	5.662	26.340	-0.029
204	8.277	33.893	141.2	91.0	5.730	26.366	-0.018

**Station: 21 Date: 11/06/2010, 0634 Lat.: 35° 27.70 N Long.: 124° 54.84 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	16.669	32.641	239.6	89.4	0.041	23.777	0.642
10	16.666	32.655	240.1	89.4	0.412	23.777	0.641
20	16.599	32.649	240.2	89.3	0.822	23.796	0.628
30	16.590	32.648	239.7	89.4	1.232	23.798	0.625
50	15.920	32.798	241.4	88.9	2.043	24.004	0.521
75	12.732	32.820	250.5	90.4	2.905	24.792	-0.049
100	11.333	32.868	240.5	90.9	3.651	25.079	-0.295
125	10.432	33.135	219.8	91.0	4.333	25.406	-0.286
150	9.168	33.421	189.4	91.1	4.932	25.817	-0.294
200	8.489	33.881	140.7	91.1	5.916	26.250	-0.070
250	7.849	33.968	118.0	91.1	6.742	26.488	-0.025
300	7.237	33.996	90.4	91.1	7.502	26.606	-0.083
400	6.581	34.123	39.5	91.2	8.891	26.782	-0.087
500	5.510	34.129	32.8	91.2	10.138	26.921	-0.220
600	5.178	34.247	15.1	91.2	11.270	27.048	-0.173
700	4.819	34.299	11.2	91.2	12.297	27.149	-0.155
800	4.474	34.366	11.4	91.2	13.242	27.232	-0.150
900	4.164	34.412	13.9	91.2	14.119	27.304	-0.146
1000	3.881	34.449	19.1	91.3	14.938	27.370	-0.138
1100	3.614	34.477	24.1	91.2	15.706	27.419	-0.144
1200	3.393	34.500	29.2	91.2	16.435	27.457	-0.150
1300	3.176	34.518	34.0	91.2	17.131	27.492	-0.156
1400	2.966	34.532	38.0	91.3	17.796	27.527	-0.161
1500	2.786	34.547	42.9	91.3	18.432	27.554	-0.167
1750	2.454	34.580	56.1	91.3	19.926	27.609	-0.171
2000	2.131	34.604	68.3	91.4	21.279	27.654	-0.181
2500	1.797	34.641	91.9	91.4	23.776	27.713	-0.179
3000	1.621	34.659	108.0	91.4	26.114	27.744	-0.180
3500	1.530	34.671	122.5	91.4	28.394	27.763	-0.180
4000	1.487	34.681	136.5	91.4	30.651	27.778	-0.179
4347	1.511	34.684	143.3	91.4	32.238	27.781	-0.178

**Station:** 22 **Date:** 11/06/2010, 1208 **Lat.:** 35° 42.42 N **Long.:** 125° 05.44 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	17.540	32.922	235.8	89.9	0.041	23.792	1.081
10	17.545	32.922	235.6	89.9	0.410	23.791	1.082
20	17.542	32.921	235.4	89.9	0.821	23.791	1.080
30	17.507	32.911	235.2	89.9	1.231	23.793	1.063
50	14.807	32.894	262.1	89.7	2.016	24.392	0.417
75	12.017	32.841	254.1	90.4	2.838	24.911	-0.207
100	11.056	32.926	240.7	90.6	3.568	25.153	-0.321
125	10.565	33.120	217.2	90.7	4.247	25.390	-0.255
150	9.315	33.360	196.3	90.7	4.851	25.787	-0.277
200	8.397	33.804	150.6	90.8	5.837	26.278	-0.071
250	7.767	33.969	97.6	90.8	6.663	26.502	-0.035
300	7.316	34.052	69.0	90.8	7.413	26.632	-0.034
400	6.274	34.094	44.0	90.9	8.776	26.806	-0.143
500	5.832	34.205	21.4	91.0	10.003	26.951	-0.112
600	4.975	34.217	15.4	91.1	11.112	27.063	-0.204
700	4.563	34.297	10.0	91.1	12.119	27.173	-0.188
800	4.262	34.361	9.6	91.1	13.041	27.257	-0.170
900	3.983	34.411	13.2	91.1	13.895	27.326	-0.160
1000	3.743	34.449	18.4	91.1	14.691	27.381	-0.155
1015	3.719	34.452	19.0	91.1	14.807	27.386	-0.155

**Station:** 23 **Date:** 11/06/2010, 1552 **Lat.:** 36° 00.32 N **Long.:** 125° 19.20 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	17.476	32.821	225.1	90.1	0.042	23.730	0.986
10	17.477	32.821	244.4	90.2	0.416	23.730	0.986
20	17.475	32.821	254.0	90.2	0.832	23.731	0.985
30	17.431	32.815	255.8	90.1	1.249	23.737	0.969
50	17.503	32.872	270.5	90.1	2.080	23.765	1.031
75	13.974	32.919	273.4	90.3	3.019	24.587	0.255
100	13.119	33.132	268.3	90.6	3.810	24.925	0.244
125	11.820	33.147	250.3	90.8	4.544	25.186	-0.002
150	10.391	33.240	227.0	90.9	5.207	25.515	-0.190
200	8.860	33.667	174.3	91.0	6.315	26.100	-0.107
250	8.022	33.914	146.9	91.0	7.195	26.422	-0.040
300	7.223	33.946	126.2	91.1	7.978	26.561	-0.132
400	6.426	34.066	58.5	91.1	9.391	26.764	-0.145
500	5.531	34.103	35.1	91.2	10.652	26.907	-0.229
600	5.011	34.182	21.3	91.2	11.800	27.031	-0.228
700	4.704	34.261	12.1	91.2	12.843	27.129	-0.201
800	4.393	34.337	9.5	91.2	13.801	27.224	-0.175
900	4.119	34.402	12.6	91.3	14.683	27.305	-0.154
1000	3.822	34.450	18.9	91.3	15.497	27.374	-0.146
1015	3.780	34.455	19.7	91.3	15.614	27.383	-0.146

**Station: 24 Date: 11/06/2010, 1910 Lat.: 36° 18.65 N Long.: 125° 32.50 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	17.571	32.783	244.3	90.0	0.042	23.678	0.980
10	17.553	32.783	225.7	90.1	0.421	23.683	0.975
20	17.541	32.786	254.1	90.2	0.841	23.689	0.974
30	17.649	32.882	254.6	90.2	1.260	23.736	1.075
50	17.216	32.905	266.4	90.2	2.085	23.858	0.987
75	13.719	32.905	268.8	90.5	2.994	24.628	0.189
100	12.420	32.980	253.5	90.8	3.779	24.943	-0.017
125	11.394	33.066	233.9	91.0	4.504	25.202	-0.147
150	9.823	33.271	217.5	91.1	5.147	25.635	-0.264
200	8.665	33.719	163.6	91.1	6.198	26.170	-0.097
250	7.937	33.913	127.2	91.1	7.068	26.433	-0.054
300	7.136	33.955	110.9	91.1	7.847	26.581	-0.136
400	6.069	34.030	59.5	91.2	9.245	26.782	-0.219
500	5.313	34.105	37.8	91.2	10.476	26.934	-0.256
600	4.804	34.180	19.6	91.3	11.590	27.053	-0.252
700	4.464	34.258	12.0	91.3	12.609	27.152	-0.229
800	4.263	34.347	9.3	91.3	13.543	27.246	-0.181
900	4.011	34.396	11.1	91.3	14.412	27.311	-0.169
1000	3.803	34.443	16.7	91.3	15.224	27.371	-0.154
1014	3.764	34.443	16.8	91.3	15.334	27.375	-0.157

**Station: 25 Date: 11/06/2010, 2248 Lat.: 36° 36.84 N Long.: 125° 46.22 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	17.397	32.690	274.3	90.1	0.042	23.648	0.863
10	17.393	32.690	267.8	90.1	0.424	23.649	0.862
20	17.356	32.686	257.8	90.1	0.848	23.656	0.849
30	16.962	32.611	259.5	89.8	1.269	23.692	0.693
50	15.449	32.696	277.2	88.0	2.086	24.100	0.404
75	12.214	32.832	253.6	90.4	2.921	24.867	-0.176
100	10.832	32.886	240.0	90.9	3.660	25.161	-0.394
125	9.939	33.194	216.9	91.0	4.315	25.554	-0.306
150	8.924	33.360	204.3	91.1	4.892	25.849	-0.341
200	8.429	33.840	139.4	91.1	5.859	26.302	-0.037
205	8.335	33.861	134.9	91.1	5.946	26.333	-0.035

Station: 26 Date: 11/06/2010, 2357 Lat.: 36° 36.94 N Long.: 125° 46.33 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	17.378	32.687	258.5	90.0	0.042	23.651	0.856
10	17.385	32.688	260.2	90.0	0.424	23.650	0.858
20	17.281	32.674	262.8	90.0	0.847	23.664	0.821
30	16.951	32.608	267.3	89.8	1.268	23.692	0.688
50	15.310	32.715	284.8	88.0	2.073	24.145	0.387
75	12.202	32.826	265.6	90.4	2.912	24.865	-0.183
100	10.901	32.917	250.6	90.9	3.649	25.174	-0.356
125	9.892	33.191	213.9	91.0	4.305	25.560	-0.316
150	8.787	33.419	196.7	91.1	4.869	25.916	-0.315
200	8.284	33.866	131.7	91.1	5.810	26.344	-0.039
250	7.575	33.941	137.6	91.1	6.623	26.508	-0.084
300	7.021	33.983	106.3	91.2	7.375	26.619	-0.130
400	5.958	34.029	54.0	91.2	8.747	26.795	-0.234
500	5.213	34.107	36.1	91.3	9.973	26.947	-0.263
600	4.814	34.200	18.4	91.3	11.072	27.068	-0.235
700	4.487	34.268	11.4	91.3	12.083	27.158	-0.219
800	4.203	34.337	10.4	91.3	13.016	27.244	-0.195
900	3.982	34.401	13.2	91.3	13.878	27.319	-0.168
1000	3.751	34.444	18.0	91.3	14.680	27.377	-0.158
1100	3.472	34.473	23.7	91.3	15.436	27.427	-0.163
1200	3.212	34.496	29.2	91.3	16.149	27.471	-0.169
1300	3.007	34.513	35.7	91.3	16.828	27.504	-0.175
1400	2.848	34.530	41.3	91.3	17.479	27.532	-0.176
1500	2.654	34.547	46.7	91.4	18.102	27.563	-0.180
1750	2.247	34.585	65.7	91.4	19.546	27.629	-0.185
2000	1.983	34.609	80.0	91.4	20.861	27.670	-0.187
2500	1.746	34.643	106.2	91.4	23.294	27.718	-0.181
3000	1.608	34.661	127.7	91.4	25.608	27.747	-0.179
3500	1.531	34.674	143.0	91.5	27.880	27.765	-0.178
4000	1.502	34.683	156.5	91.4	30.138	27.778	-0.177
4437	1.525	34.685	163.7	91.3	32.146	27.782	-0.177

**Station:** 27 **Date:** 11/07/2010, 0505 **Lat.:** 36° 46.86 N **Long.:** 125° 24.67 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	15.530	32.382	251.8	88.9	0.041	23.839	0.173
10	15.543	32.382	268.2	88.8	0.406	23.836	0.176
20	15.290	32.384	271.0	88.6	0.809	23.894	0.119
30	15.196	32.396	271.2	88.6	1.209	23.924	0.107
50	13.896	32.564	276.2	89.2	1.972	24.328	-0.045
75	10.369	32.714	266.0	90.7	2.752	25.107	-0.614
100	9.455	32.870	247.0	90.8	3.438	25.380	-0.629
125	8.759	33.227	206.1	90.9	4.039	25.770	-0.473
150	8.205	33.538	175.5	91.0	4.555	26.097	-0.311
200	8.394	33.977	85.1	90.8	5.426	26.414	0.066
250	7.724	34.018	74.8	90.9	6.216	26.547	-0.002
300	7.019	34.041	60.7	91.0	6.947	26.665	-0.084
400	6.131	34.093	41.5	91.0	8.290	26.824	-0.162
500	5.403	34.138	28.4	91.1	9.502	26.950	-0.216
600	4.857	34.204	16.8	91.1	10.606	27.066	-0.228
700	4.649	34.298	10.2	91.1	11.610	27.164	-0.177
800	4.335	34.362	9.8	91.1	12.540	27.250	-0.161
900	4.030	34.408	12.4	91.1	13.400	27.319	-0.157
1000	3.716	34.441	16.3	91.2	14.205	27.378	-0.163
1013	3.689	34.446	17.1	91.2	14.306	27.384	-0.163

**Station:** 28 **Date:** 11/07/2010, 0848 **Lat.:** 36° 56.75 N **Long.:** 125° 03.00 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	15.739	32.373	248.5	89.3	0.041	23.786	0.214
10	15.735	32.374	255.4	89.3	0.411	23.788	0.214
20	15.260	32.430	267.5	88.7	0.818	23.936	0.149
30	14.715	32.529	274.1	88.1	1.206	24.129	0.106
50	12.297	32.620	263.8	90.2	1.912	24.687	-0.329
75	10.362	32.733	259.9	90.8	2.666	25.123	-0.600
100	9.129	33.041	231.7	91.0	3.330	25.566	-0.562
125	8.610	33.484	198.9	91.1	3.880	25.994	-0.291
150	8.020	33.648	171.3	91.1	4.354	26.211	-0.251
200	7.525	33.878	126.7	91.1	5.191	26.464	-0.142
250	7.358	34.025	83.0	91.1	5.951	26.605	-0.049
300	6.822	34.065	64.7	91.2	6.659	26.710	-0.092
400	6.288	34.156	35.6	91.2	7.968	26.853	-0.092
500	5.442	34.178	23.2	91.3	9.155	26.976	-0.180
600	5.035	34.252	12.9	91.3	10.242	27.084	-0.170
700	4.672	34.330	9.9	91.3	11.235	27.187	-0.150
800	4.361	34.380	11.1	91.3	12.149	27.262	-0.144
900	3.948	34.412	13.3	91.3	12.995	27.331	-0.162
1000	3.725	34.456	19.4	91.3	13.790	27.388	-0.151
1015	3.671	34.457	19.2	91.3	13.905	27.395	-0.156

**Station: 29 Date: 11/07/2010, 1224 Lat.: 37° 06.84 N Long.: 124° 41.68 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	16.003	32.391	240.5	89.9	0.041	23.741	0.290
10	16.011	32.395	263.7	89.7	0.415	23.743	0.295
20	15.936	32.396	267.0	89.6	0.829	23.760	0.278
30	14.788	32.467	274.4	88.3	1.225	24.066	0.072
50	12.172	32.620	268.6	90.3	1.936	24.710	-0.354
75	10.065	32.804	251.0	90.9	2.675	25.228	-0.595
100	9.026	33.118	208.0	91.0	3.315	25.642	-0.517
125	8.335	33.433	184.9	91.1	3.861	25.996	-0.374
150	7.874	33.690	155.7	91.1	4.335	26.266	-0.239
200	7.305	33.902	129.3	91.1	5.149	26.514	-0.153
250	6.917	33.966	100.2	91.1	5.895	26.619	-0.157
300	6.546	34.017	67.4	91.2	6.597	26.709	-0.167
400	6.060	34.128	35.0	91.2	7.894	26.860	-0.143
500	5.516	34.195	20.2	91.2	9.072	26.981	-0.158
600	5.192	34.280	12.9	91.2	10.156	27.088	-0.130
700	4.609	34.311	10.3	91.3	11.152	27.179	-0.172
800	4.397	34.377	11.4	91.2	12.073	27.256	-0.143
900	3.991	34.411	13.6	91.3	12.929	27.325	-0.159
1000	3.811	34.461	20.8	91.2	13.727	27.384	-0.139
1013	3.728	34.460	19.8	91.2	13.827	27.391	-0.148

**Station: 30 Date: 11/07/2010, 1605 Lat.: 37° 16.84 N Long.: 124° 20.05 W**

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	14.776	32.979	268.0	89.3	0.035	24.463	0.479
10	14.637	33.000	255.6	89.3	0.345	24.509	0.465
20	12.784	33.370	241.8	89.0	0.637	25.173	0.368
30	12.409	33.500	220.2	88.9	0.910	25.347	0.396
50	9.841	33.564	165.0	90.7	1.373	25.858	-0.025
75	8.845	33.624	159.7	90.9	1.888	26.067	-0.141
100	8.549	33.784	118.8	90.9	2.355	26.238	-0.061
125	8.814	33.997	94.5	91.0	2.784	26.364	0.148
150	8.116	33.967	97.9	91.0	3.196	26.447	0.016
200	7.418	34.008	83.8	91.1	3.961	26.582	-0.054
250	7.063	34.046	62.1	91.2	4.681	26.662	-0.073
300	6.693	34.079	47.7	91.2	5.368	26.738	-0.099
400	5.928	34.146	28.9	91.2	6.644	26.891	-0.146
500	5.312	34.208	18.6	91.3	7.787	27.016	-0.172
600	5.054	34.280	11.3	91.3	8.845	27.104	-0.145
700	4.679	34.331	9.9	91.3	9.827	27.188	-0.148
800	4.330	34.373	10.6	91.3	10.743	27.259	-0.154
900	4.060	34.407	13.1	91.3	11.602	27.315	-0.155
1000	3.738	34.453	18.9	91.3	12.403	27.385	-0.152
1009	3.732	34.459	19.7	91.3	12.473	27.390	-0.148

**Station:** 31 **Date:** 11/07/2010, 1947 **Lat.:** 37° 26.88 N **Long.:** 123° 58.33 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	14.797	32.794	251.9	88.1	0.036	24.315	0.336
10	15.085	33.061	278.6	85.9	0.356	24.460	0.612
20	15.003	33.244	274.0	85.1	0.691	24.618	0.738
30	14.578	33.459	239.3	87.0	1.015	24.876	0.814
50	10.932	33.480	179.1	89.9	1.551	25.605	0.100
75	10.001	33.715	142.6	90.7	2.103	25.950	0.121
100	9.415	33.896	115.4	90.9	2.588	26.189	0.166
125	8.795	33.918	101.0	90.9	3.032	26.305	0.083
150	8.497	33.977	94.0	90.9	3.455	26.398	0.083
200	7.903	34.045	77.0	91.1	4.246	26.541	0.046
250	7.513	34.101	52.8	91.1	4.984	26.642	0.033
300	7.234	34.163	39.9	91.2	5.678	26.731	0.042
400	6.221	34.168	31.1	91.2	6.960	26.871	-0.091
500	5.565	34.208	21.3	91.2	8.131	26.986	-0.142
600	4.796	34.227	15.1	91.2	9.212	27.091	-0.216
700	4.586	34.312	9.9	91.2	10.198	27.183	-0.173
800	4.282	34.379	11.1	91.2	11.105	27.269	-0.154
900	4.057	34.422	14.4	91.2	11.954	27.328	-0.144
1000	3.740	34.447	17.6	91.3	12.750	27.380	-0.156
1012	3.714	34.450	17.7	91.3	12.843	27.385	-0.157

**Station:** 32 **Date:** 11/07/2010, 2314 **Lat.:** 37° 36.80 N **Long.:** 123° 36.70 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	15.312	32.956	253.5	86.3	0.036	24.328	0.580
10	15.305	32.958	266.9	86.2	0.359	24.332	0.580
20	15.257	32.985	276.5	86.0	0.716	24.364	0.591
30	14.382	33.156	275.4	87.4	1.060	24.684	0.532
50	11.037	33.109	238.8	90.2	1.642	25.298	-0.177
75	9.710	33.319	197.4	90.7	2.267	25.689	-0.244
100	8.885	33.546	161.7	90.9	2.801	26.000	-0.198
125	8.451	33.692	157.9	91.0	3.281	26.181	-0.150
150	8.253	33.825	149.7	91.0	3.725	26.315	-0.075
200	7.676	33.946	118.8	91.0	4.543	26.496	-0.065
250	7.396	34.052	68.7	91.1	5.294	26.620	-0.023
300	6.704	34.075	53.6	91.1	5.993	26.734	-0.100
400	6.370	34.199	40.8	91.2	7.263	26.877	-0.047
500	5.580	34.209	19.6	91.2	8.444	26.985	-0.139
600	5.138	34.264	13.0	91.3	9.528	27.082	-0.149
700	4.722	34.323	10.4	91.3	10.528	27.176	-0.150
800	4.524	34.389	12.0	91.3	11.450	27.251	-0.120
900	4.147	34.414	14.3	91.3	12.321	27.312	-0.141
1000	3.861	34.434	15.7	91.3	13.141	27.358	-0.155
1013	3.839	34.439	16.1	91.3	13.245	27.364	-0.153

**Station:** 33 **Date:** 11/08/2010, 0237 **Lat.:** 37° 41.90 N **Long.:** 123° 25.77 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	14.067	33.185	261.2	84.8	0.032	24.771	0.488
10	14.045	33.187	279.6	85.1	0.317	24.777	0.485
20	13.811	33.270	279.4	87.0	0.629	24.890	0.500
30	12.779	33.303	244.7	88.5	0.923	25.123	0.313
50	10.601	33.365	202.4	90.3	1.445	25.573	-0.052
75	9.664	33.594	152.5	90.7	1.999	25.912	-0.005
100	8.927	33.728	137.0	90.9	2.491	26.135	-0.046
125	8.501	33.859	130.0	90.9	2.940	26.304	-0.010
150	8.326	33.954	114.0	90.9	3.359	26.406	0.039
200	7.695	34.006	100.2	91.0	4.147	26.541	-0.015
250	7.529	34.068	61.2	91.1	4.886	26.614	0.009
300	7.335	34.128	49.9	90.9	5.599	26.689	0.028
400	6.539	34.173	33.3	91.2	6.923	26.834	-0.046
500	5.721	34.203	21.7	91.1	8.128	26.963	-0.127
600	5.251	34.294	11.7	91.2	9.213	27.092	-0.113
700	4.766	34.317	10.2	91.3	10.216	27.166	-0.150
800	4.479	34.383	12.1	91.2	11.152	27.251	-0.130
900	4.162	34.423	15.3	91.2	12.014	27.318	-0.132
1000	3.880	34.447	18.0	91.3	12.828	27.366	-0.143
1010	3.863	34.449	18.3	91.3	12.908	27.369	-0.143

**Station:** 34 **Date:** 11/08/2010, 0438 **Lat.:** 37° 46.90 N **Long.:** 123° 14.80 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	13.727	33.096	271.8	83.4	0.032	24.772	0.345
10	13.698	33.103	279.0	84.1	0.316	24.784	0.344
20	12.734	33.422	223.5	88.0	0.611	25.224	0.399
30	11.092	33.376	208.0	89.7	0.868	25.495	0.046
50	10.094	33.675	144.2	89.9	1.328	25.902	0.106
75	10.013	33.797	119.9	86.0	1.837	26.012	0.188
100	9.855	33.825	116.1	86.7	2.332	26.060	0.183
122	9.546	33.907	111.3	86.6	2.758	26.176	0.196

**Station:** 35 **Date:** 11/08/2010, 0625 **Lat.:** 37° 51.90 N **Long.:** 123° 04.00 W

P(dbar)	T(°C)	S	O <sub>2</sub> (μm/kg)	Xmiss(%)	ΔΦ	σ <sub>θ</sub>	π <sub>θ</sub>
0	13.382	33.301	309.0	81.8	0.029	25.001	0.436
10	12.826	33.346	292.0	83.4	0.292	25.147	0.357
20	11.164	33.276	234.4	89.2	0.556	25.404	-0.020
30	10.716	33.288	219.2	89.8	0.807	25.494	-0.091
50	10.425	33.571	174.1	90.4	1.279	25.765	0.081
75	10.123	33.790	124.4	89.3	1.808	25.988	0.202
82	9.958	33.817	113.9	76.9	1.947	26.037	0.195

**Station:** 36 **Date:** 11/08/2010, 0737 **Lat.:** 37° 53.93 N **Long.:** 122° 59.74 W

<b>P(dbar)</b>	<b>T(°C)</b>	<b>S</b>	<b>O<sub>2</sub>(μm/kg)</b>	<b>Xmiss(%)</b>	<b>ΔΦ</b>	<b>σ<sub>θ</sub></b>	<b>π<sub>θ</sub></b>
0	13.968	33.278	275.7	85.2	0.031	24.863	0.540
10	13.985	33.276	285.6	85.6	0.308	24.858	0.542
20	12.853	33.527	254.5	86.5	0.600	25.282	0.506
30	11.925	33.556	194.9	89.2	0.859	25.482	0.346
50	10.554	33.741	128.7	84.9	1.309	25.875	0.239
67	10.354	33.769	117.9	79.0	1.662	25.932	0.226

**Table A3:** Results of nutrient and primary productivity analyses at hydrographic stations where those water samples were collected during the PaCOOS cruise of November 2010. Stations are in chronological (and numerical) order. The time listed (<Mon. dd, yyyy hh:mm> UT) for each station is the beginning of the CTD cast. 12 Niskin bottles were tripped at most stations. The data for each station are separated into up to three sections (“Physical and Chemical,” “Biological,” and “Integrated Values”).

The physical oceanographic properties listed in the first seven and the last columns of the “Physical and Chemical” section of each station’s data are the uncorrected values measured by the CTD at the times each Niskin bottle was tripped. Because they are uncorrected, these values may differ slightly from those listed in Table A2. Columns eight through eleven of this section give the nitrate ( $\text{NO}_3$ ), nitrite ( $\text{NO}_2$ ), phosphate ( $\text{PO}_4$ ), and dissolved silicate ( $\text{SiO}_4$ ) concentrations.

When included, the “Biological” section of each station’s data gives the results of the nutrient and primary productivity analyses, while the “Integrated Values” section sums the nutrient and primary productivity results over the water column to the depth at which light intensity reaches 1% of its surface value.

<b>Date GMT:</b> Nov 04, 2010 14:23	<b>Cruise:</b> S510	<b>Latitude:</b> 36.796	<b>Year:</b> 2010
<b>Project:</b> PACOOS	<b>Station:</b> C1	<b>Longitude:</b> -121.849	<b>Work week:</b> 45
<b>Platform:</b> POINT SUR	<b>Cast:</b> 2	<b>Secchi Depth:</b> ---	<b>Day of Year:</b> 308

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

#### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 ( $\mu\text{M}$ )	NO2 ( $\mu\text{M}$ )	PO4 ( $\mu\text{M}$ )	SIO4 ( $\mu\text{M}$ )	O2 ( $\text{ml l}^{-1}$ )
0	1.5	12	14.320	33.519	24.976	78	3.056	0.247	0.718	3.497	7.162
5	5.1	11	14.161	33.514	25.006	76	4.684	0.346	0.857	3.439	6.894
10	10.3	10	13.661	33.510	25.105	87	7.907	0.516	0.907	5.079	5.926
20	20.3	9	12.767	33.531	25.301	92	12.941	0.642	1.382	8.948	4.899
30	29.6	8	11.929	33.605	25.519	92	17.710	0.477	1.582	13.168	4.066
40	40.5	7	11.444	33.639	25.635	93	20.011	0.171	1.793	16.141	3.656
60	60.4	6	10.992	33.688	25.756	91	22.252	0.110	1.963	20.561	3.189
80	79.8	5	10.725	33.719	25.827	84	23.942	0.168	2.208	24.318	2.913
100	101.1	4	10.315	33.778	25.944	80	25.815	0.146	2.251	28.424	2.535
150	151.2	3	9.619	33.895	26.153	83	22.637	0.122	1.851	21.230	1.990
200	203.0	2	9.506	33.912	26.185	83	28.781	0.180	2.525	37.648	1.928
285	289.3	1	8.416	34.058	26.472	83	32.253	0.127	2.714	48.742	1.317

#### Biological

DEP (m)	BTL #	CHL ( $\text{mg m}^{-3}$ )	PHAEAO ( $\text{mg m}^{-3}$ )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION ( $\text{mg m}^{-3}$ )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	5.379	0.771	0	100	231.393	43.021	0
5	11	4.406	0.418	0	50	268.151	49.855	3
10	10	2.102	0.697	5	30	122.485	27.801	5
20	9	0.468	0.531	5	15	109.937	24.953	8
30	8	0.232	0.297	10	5	18.825	8.956	14
40	7	0.115	0.207	10	1	6.122	2.913	26
60	6	0.088	0.230	20	0.1	0.000	0.000	54
80	5	0.075	0.283					
100	4	0.065	0.262					
150	3	0.102	0.226					
200	2	0.123	0.456					

#### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll <i>a</i> :	84.68	$\text{mg m}^{-2}$	Carbon Fixation:	2011.2	$\text{mg m}^{-2}$
Phaeophytin:	16.62	$\text{mg m}^{-2}$	Productivity Index:	23.75	

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen,  $\mu\text{M}$  micromole/kg

**Date GMT:** Nov 04, 2010 16:32  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** H3  
**Cast:** 3

**Latitude:** 36.735  
**Longitude:** -122.023  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 308

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
0	1.4	12	14.044	33.449	24.980	80	4.204	0.209	0.761	4.179	6.446
5	4.9	11	13.873	33.478	25.037	84	6.696	0.390	0.972	4.549	6.214
10	10.8	10	13.191	33.521	25.209	91	10.549	0.567	1.134	7.380	5.355
20	20.5	9	12.280	33.553	25.412	92	15.436	0.663	1.450	12.243	4.519
30	31.0	8	11.824	33.607	25.540	93	18.039	0.629	1.590	14.693	4.013
40	40.6	7	11.427	33.642	25.641	94	19.841	0.417	1.672	16.083	3.647
60	59.8	6	11.008	33.694	25.757	89	22.509	0.119	1.903	21.635	3.128
80	80.8	5	10.060	33.794	26.000	94	26.170	0.060	2.022	27.645	2.401
100	101.1	4	9.612	33.782	26.065	95	26.690	0.047	2.160	28.742	2.550
150	150.9	3	9.397	33.931	26.217	94	29.002	0.062	2.301	33.939	1.958
200	202.6	2	8.705	34.076	26.441	95	31.871	0.038	2.455	42.204	1.387
1005	1013.0	1	3.798	34.459	27.376	91	43.466	0.032	3.497	131.865	0.553

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	5.012	0.621	0	100	158.098	31.547	0
5	11	2.900	0.863	0	50	168.419	33.607	3
10	10	0.982	0.706	5	30	57.560	19.845	5
20	9	0.468	0.445	5	15	61.857	21.327	9
30	8	0.265	0.295	10	5	6.922	7.048	17
40	7	0.091	0.158	10	1	2.831	2.883	31
60	6	0.155	0.324	20	0.1	0.036	0.077	60
80	5	0.067	0.165					
100	4	0.073	0.135					
150	3	0.028	0.100					
200	2	0.028	0.081					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 63.53 mg m<sup>-2</sup>  
 Phaeophytin: 22.95 mg m<sup>-2</sup>

Carbon Fixation: 1290.2 mg m<sup>-2</sup>  
 Productivity Index: 20.31

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 04, 2010 18:56      **Cruise:** S510      **Latitude:** 36.709      **Year:** 2010  
**Project:** PACOOS      **Station:** NPS1      **Longitude:** -122.239      **Work week:** 45  
**Platform:** POINT SUR      **Cast:** 4      **Secchi Depth:** ---      **Day of Year:** 308

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

#### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
0	0.6	12	14.073	33.380	24.920	82	5.757	0.251	0.756	5.118	6.165
50	49.7	11	10.366	33.580	25.781	94	21.454	0.042	1.817	20.118	3.502
100	100.5	10	9.191	33.809	26.155	94	28.174	0.032	2.114	30.995	2.582
200	202.2	9	8.489	34.104	26.496	94	31.788	0.045	2.629	42.205	1.363
300	303.3	8	7.664	34.146	26.653	94	33.251	0.044	2.556	50.369	1.012
400	403.1	7	6.630	34.182	26.824	94	36.802	0.037	2.921	65.177	0.628
500	504.9	6	5.974	34.230	26.947	94	37.268	0.020	2.927	74.285	0.407
600	605.0	5	5.289	34.291	27.079	94	---	---	---	---	0.236
700	706.0	4	4.893	34.346	27.169	95	42.872	0.016	3.432	104.626	0.189
805	810.6	3	4.507	34.383	27.241	94	---	---	---	---	0.216
905	912.1	2	4.195	34.423	27.307	94	42.524	0.032	3.336	118.896	0.305
1010	1018.1	1	3.901	34.452	27.361	94	---	---	---	---	0.393

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll a, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 04, 2010 22:20  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** 67-55  
**Cast:** 5b

**Latitude:** 36.617  
**Longitude:** -122.432  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 308

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
0	1.5	12	14.274	33.434	24.920	82	5.295	0.208	0.643	4.330	6.280
5	5.6	11	13.625	33.299	24.950	89	5.421	0.179	0.648	4.723	6.085
10	10.2	10	13.780	33.397	24.994	83	5.606	0.226	0.810	4.304	6.168
20	20.9	9	12.755	33.267	25.098	91	10.271	0.232	0.942	9.131	5.699
30	29.9	8	11.033	33.128	25.312	93	13.740	0.075	1.095	12.253	5.195
40	39.3	7	10.406	33.200	25.477	94	16.411	0.084	1.310	15.672	4.970
60	59.9	6	9.436	33.350	25.756	94	20.591	0.059	1.611	21.185	4.440
80	80.2	5	8.872	33.543	25.997	94	---	---	---	---	3.938
100	100.8	4	8.480	33.739	26.212	94	25.138	0.054	1.827	30.082	3.510
150	149.4	3	8.116	33.893	26.387	94	28.335	0.047	2.049	36.604	3.199
200	202.9	1	7.742	34.029	26.549	94	---	---	---	---	2.106

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	3.378	0.515	0	100	141.191	41.801	0
5	11	2.588	0.607	5	50	140.980	54.467	3
10	10	2.377	0.594	5	30	92.411	35.702	6
20	9	0.542	0.311	10	15	65.574	27.584	9
30	8	0.207	0.158	20	5	6.619	12.222	16
40	7	0.106	0.102	20	1	1.538	2.839	30
60	6	0.092	0.091	40	0.1	0.000	0.000	68
100	4	0.041	0.049					
150	3	0.008	0.042					
200	2	0.012	0.023					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 42.64 mg m<sup>-2</sup>  
Phaeophytin: 12.93 mg m<sup>-2</sup>

Carbon Fixation: 1342.4 mg m<sup>-2</sup>  
Productivity Index: 31.48

\*Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 05, 2010 00:09  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** NPS2  
**Cast:** 6

**Latitude:** 36.542  
**Longitude:** -122.598  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 309

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

#### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (µM)	NO2 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l <sup>-1</sup> )
0	1.7	12	15.045	33.136	24.525	87	2.583	0.111	0.516	3.613	5.945
50	51.9	11	10.136	33.328	25.623	94	19.443	0.029	1.612	17.804	4.548
100	102.9	10	9.254	33.869	26.192	94	28.536	0.025	2.113	29.803	2.317
200	202.5	9	8.094	34.034	26.501	94	31.515	0.029	2.413	40.389	1.823
300	304.0	8	7.666	34.163	26.666	95	34.097	0.015	2.659	50.825	0.993
400	404.1	7	6.764	34.199	26.820	94	38.006	0.002	3.028	66.140	0.618
500	505.3	6	5.923	34.224	26.949	95	40.381	0.000	3.279	78.792	0.415
600	605.8	5	5.449	34.310	27.076	95	41.011	0.005	3.349	88.397	0.218
700	706.5	4	4.985	34.352	27.163	95	43.039	0.008	3.466	99.748	0.188
800	809.1	3	4.412	34.376	27.246	95	44.135	0.017	3.622	112.460	0.196
905	912.9	2	4.168	34.421	27.308	95	44.306	0.019	3.558	117.599	0.275
1005	1013.2	1	3.881	34.449	27.360	95	---	---	---	---	0.367

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll a, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **µM** micromole/kg

**Date GMT:** Nov 05, 2010 02:03  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** 67-60  
**Cast:** 7

**Latitude:** 36.458  
**Longitude:** -122.778  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 309

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (µM)	NO2 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l <sup>-1</sup> )
0	1.5	12	15.299	33.222	24.536	88	2.005	0.091	0.428	2.778	5.917
5	4.8	11	15.303	33.221	24.535	87	2.021	0.104	0.600	2.731	5.915
10	10.4	10	15.100	33.240	24.593	86	2.363	0.100	0.514	2.684	5.958
20	21.1	9	14.749	33.288	24.707	87	3.372	0.172	0.765	3.430	5.899
30	30.7	8	13.152	33.515	25.213	92	10.153	0.715	1.083	5.997	4.932
40	39.8	7	12.564	33.548	25.354	93	14.290	0.653	1.276	9.866	4.499
60	60.8	6	10.813	33.678	25.780	94	22.769	0.075	1.791	22.123	2.764
80	82.3	5	10.080	33.819	26.017	94	---	---	---	---	2.204
100	101.3	4	9.927	33.864	26.077	94	26.795	0.032	2.157	28.887	2.070
150	153.0	3	9.340	34.004	26.284	94	27.338	0.026	2.135	30.695	1.786
205	207.1	2	8.904	34.074	26.408	94	---	---	---	---	1.560
1005	1014.1	1	3.863	34.461	27.372	94	44.380	0.024	3.550	126.095	0.409

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.799	0.175	0	100	58.249	72.945	0
5	11	0.854	0.206	5	50	57.387	67.229	6
10	10	1.111	0.319	5	30	38.908	45.581	9
20	9	1.358	0.364	10	15	44.335	39.920	14
30	8	0.532	0.355	20	5	18.585	13.682	22
40	7	0.322	0.280	20	1	3.528	2.597	35
60	6	0.103	0.171	40	0.1	0.000	0.000	61
100	4	0.060	0.198					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 39.52 mg m<sup>-2</sup>  
Phaeophytin: 10.41 mg m<sup>-2</sup>

Carbon Fixation: 1091.1 mg m<sup>-2</sup>  
Productivity Index: 27.61

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, µM micromole/kg

**Date GMT:** Nov 05, 2010 04:32  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** NPS3  
**Cast:** 8

**Latitude:** 36.377  
**Longitude:** -122.955  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 309

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
0	1.7	12	14.791	33.354	24.748	85	3.871	0.145	0.507	3.491	5.874
50	51.4	11	10.844	33.680	25.776	94	22.922	0.087	1.843	21.391	2.982
100	102.1	10	9.837	33.887	26.110	94	27.376	0.026	2.132	29.443	2.017
200	203.9	9	8.908	34.075	26.409	94	31.118	0.000	2.337	39.454	1.462
300	302.7	8	7.990	34.152	26.609	94	33.920	0.003	2.533	48.333	1.104
400	405.1	7	6.916	34.189	26.792	94	37.139	0.054	2.916	64.109	0.687
500	506.2	6	6.271	34.224	26.905	94	39.517	0.006	3.105	74.908	0.452
600	607.4	5	5.709	34.290	27.028	94	40.976	0.041	3.366	87.551	0.256
705	710.0	4	5.033	34.338	27.147	94	42.919	0.000	3.377	100.416	0.191
800	809.0	3	4.585	34.396	27.243	94	43.694	0.030	3.442	112.165	0.226
900	911.0	2	4.208	34.426	27.308	94	44.040	0.000	3.391	120.029	0.297
1005	1013.7	1	3.968	34.454	27.355	94	44.263	0.026	3.554	121.162	0.390

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll a, **PHAE0** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 05, 2010 06:27  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** 67-65  
**Cast:** 9

**Latitude:** 36.292  
**Longitude:** -123.134  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 309

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (µM)	NO2 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l <sup>-1</sup> )
0	2.0	12	14.702	33.361	24.773	84	3.240	0.119	0.463	2.915	6.010
5	5.9	11	14.703	33.360	24.772	84	3.162	0.113	0.504	2.404	6.001
10	11.9	10	14.706	33.373	24.781	83	2.481	0.109	0.374	1.441	6.007
20	19.1	9	14.535	33.457	24.882	84	2.081	0.174	0.672	0.028	6.061
30	30.3	8	13.473	33.492	25.130	91	6.509	0.487	0.673	2.570	5.623
40	40.4	7	12.524	33.540	25.355	92	12.793	0.642	1.145	8.085	4.440
60	59.6	6	11.448	33.571	25.582	93	18.620	0.374	1.391	15.224	3.649
80	80.0	5	10.414	33.725	25.885	94	25.331	0.089	1.927	24.134	2.649
100	100.3	4	9.476	33.752	26.064	94	27.157	0.042	1.917	28.297	2.737
150	150.3	3	8.690	33.920	26.321	94	28.668	0.035	2.089	33.145	2.608
200	202.4	2	8.104	34.003	26.475	94	30.844	0.008	2.177	38.875	2.138
1005	1012.4	1	3.892	34.445	27.356	94	44.505	0.004	3.398	123.200	0.339

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	1.900	0.460	0	100	83.996	44.209	0
5	11	1.992	0.515	5	50	93.820	47.105	4
10	10	2.185	0.615	5	30	80.099	40.216	7
20	9	3.001	0.771	10	15	65.307	29.896	10
30	8	1.092	0.760	20	5	27.501	9.163	16
40	7	0.560	0.586	20	1	6.910	2.302	24
60	6	0.241	0.337	40	0.1	0.770	1.374	38
80	5	0.077	0.183					
100	4	0.017	0.126					
150	3	0.014	0.071					
200	2	0.007	0.059					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 59.97 mg m<sup>-2</sup>  
 Phaeophytin: 15.62 mg m<sup>-2</sup>

Carbon Fixation: 1259.8 mg m<sup>-2</sup>  
 Productivity Index: 21.01

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, µM micromole/kg

**Date GMT:** Nov 05, 2010 08:57  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** NPS4  
**Cast:** 10

**Latitude:** 36.208  
**Longitude:** -123.312  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 309

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

#### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (µM)	NO2 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l <sup>-1</sup> )
5	3.6	12	15.903	32.736	24.029	90	0.187	0.047	0.413	1.798	5.720
50	50.6	11	11.185	33.029	25.208	94	11.865	0.031	1.063	10.978	5.318
100	102.2	10	9.032	33.447	25.897	94	22.754	0.064	1.712	23.625	4.043
200	203.2	9	8.256	34.056	26.495	94	31.725	0.025	2.346	40.325	1.747
300	304.2	8	7.268	34.117	26.686	94	35.604	0.026	2.746	53.013	1.037
405	406.9	7	6.399	34.147	26.828	94	38.279	0.045	2.928	66.032	0.679
500	504.9	6	5.587	34.185	26.960	94	40.595	0.030	3.316	81.059	0.454
600	606.0	5	5.319	34.286	27.072	94	---	---	---	---	0.218
700	708.0	4	4.938	34.358	27.174	94	41.777	0.043	3.469	98.277	0.181
800	808.7	3	4.468	34.388	27.249	94	43.660	0.033	3.548	109.775	0.203
900	911.1	2	4.212	34.433	27.313	94	44.151	0.034	3.496	118.345	0.305
1005	1017.3	1	3.910	34.462	27.367	94	43.398	0.030	3.547	120.764	0.420

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll a, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **µM** micromole/kg

**Date GMT:** Nov 05, 2010 11:02      **Cruise:** S510      **Latitude:** 36.125      **Year:** 2010  
**Project:** PACOOS      **Station:** 67-70      **Longitude:** -123.490      **Work week:** 45  
**Platform:** POINT SUR      **Cast:** 11      **Secchi Depth:** ---      **Day of Year:** 309

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
0	1.4	12	16.279	32.788	23.984	91	0.024	0.011	0.393	1.750	5.691
5	5.1	11	16.282	32.788	23.983	92	0.034	0.011	0.490	1.201	5.672
10	9.0	10	16.133	32.798	24.024	91	0.037	0.035	0.577	1.081	5.736
20	20.3	9	15.780	32.827	24.126	90	0.201	0.029	0.375	1.388	5.800
30	30.3	8	15.479	32.860	24.218	90	0.326	0.038	0.469	1.406	5.815
40	40.6	7	14.687	32.815	24.355	91	0.879	0.139	0.545	2.672	5.852
60	61.3	6	12.346	32.974	24.951	93	6.404	0.171	0.861	5.757	5.686
80	80.5	5	11.179	33.040	25.218	94	8.928	0.035	0.957	7.745	5.338
100	101.5	4	9.824	33.257	25.620	94	15.579	0.028	1.333	14.958	4.737
150	151.8	3	8.616	33.637	26.110	94	23.840	0.023	1.736	25.865	3.674
200	202.9	2	7.942	33.903	26.421	94	27.151	0.026	2.045	34.162	3.209
1000	1010.6	1	3.850	34.458	27.371	94	43.896	0.037	3.475	122.452	0.404

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.313	0.106	0	100	10.495	33.532	0
5	11	0.356	0.124	5	50	12.418	34.868	8
10	10	0.416	0.167	5	30	12.532	35.191	13
20	9	0.652	0.218	10	15	11.003	26.464	20
30	8	0.605	0.214	20	5	7.035	10.795	29
40	7	0.551	0.336	20	1	1.308	2.007	44
60	6	0.221	0.198	40	0.1	0.192	0.349	69
80	5	0.137	0.145					
100	4	0.039	0.059					
150	3	0.023	0.030					
200	2	0.005	0.021					
1000	1	0.004	0.010					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 21.77 mg m<sup>-2</sup>      Carbon Fixation: 380.52 mg m<sup>-2</sup>  
Phaeophytin: 7.58 mg m<sup>-2</sup>      Productivity Index: 17.48

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 05, 2010 13:28  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** NPS5  
**Cast:** 12

**Latitude:** 36.043  
**Longitude:** -123.668  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 309

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

#### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (µM)	NO2 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l <sup>-1</sup> )
0	1.9	12	16.606	32.715	23.853	92	0.079	0.029	0.389	1.581	5.600
50	50.7	11	13.400	32.770	24.586	93	1.264	0.190	0.458	3.096	5.887
100	103.0	10	10.275	33.185	25.489	94	15.243	0.019	1.239	14.690	5.043
200	203.1	9	7.999	33.912	26.420	94	26.478	0.007	1.814	33.557	3.298
300	304.9	8	6.916	34.021	26.659	94	34.281	0.009	2.398	52.502	1.792
400	405.6	7	5.766	34.048	26.829	94	39.263	0.010	2.926	70.738	1.125
500	505.7	6	5.475	34.179	26.968	94	41.285	0.015	3.204	83.162	0.475
605	607.9	5	4.861	34.239	27.088	94	43.215	0.015	3.361	97.330	0.275
700	707.3	4	4.550	34.316	27.183	94	43.911	0.029	3.399	107.654	0.179
805	810.8	3	4.237	34.369	27.259	94	44.339	0.030	3.490	114.606	0.200
905	911.4	2	3.993	34.422	27.327	94	44.982	0.018	3.442	123.628	0.297
1005	1014.1	1	3.762	34.460	27.381	94	44.398	0.063	3.543	127.034	0.429

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll a, **PHAE0** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **µM** micromole/kg

**Date GMT:** Nov 05, 2010 15:35  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** 67-75  
**Cast:** 13

**Latitude:** 35.960  
**Longitude:** -123.845  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 309

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
0	1.6	12	16.702	32.678	23.802	92	0.042	0.009	0.483	0.949	5.588
5	5.3	11	16.702	32.678	23.802	92	---	---	---	---	5.602
10	10.0	10	16.704	32.677	23.801	92	0.030	0.014	0.447	0.638	5.584
20	20.5	9	16.704	32.676	23.800	92	0.029	0.027	0.440	0.551	5.577
30	30.5	8	16.733	32.716	23.824	92	0.000	0.020	0.408	0.989	5.593
40	41.2	7	16.314	32.782	23.971	92	0.062	0.017	0.422	1.338	5.640
60	60.8	6	14.128	32.766	24.435	92	0.746	0.197	0.507	2.162	5.848
80	82.2	5	11.433	32.776	24.967	93	3.083	0.049	0.598	3.668	5.919
100	101.0	4	10.440	32.929	25.261	94	9.210	0.027	0.991	8.442	5.482
150	153.1	3	8.875	33.534	25.990	94	---	---	---	---	3.943
200	202.1	2	8.025	33.847	26.365	94	26.427	0.020	1.966	32.988	3.355
1000	1012.2	1	3.882	34.458	27.367	94	44.533	0.018	3.296	125.766	0.404

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.217	0.059	0	100	7.190	33.193	0
10	10	0.209	0.062	0	50	7.104	32.796	10
20	9	0.212	0.061	10	30	6.342	30.303	17
30	8	0.307	0.108	20	15	5.792	27.316	27
40	7	0.423	0.188	30	5	3.034	9.866	39
60	6	0.443	0.200	40	1	1.061	2.507	56
80	5	0.426	0.251	80	0.1	0.000	0.000	78
100	4	0.108	0.103					
150	3	0.035	0.050					
200	2	0.005	0.017					
1000	1	0.002	0.012					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 14.92 mg m<sup>-2</sup>  
 Phaeophytin: 5.08 mg m<sup>-2</sup>

Carbon Fixation: 266.28 mg m<sup>-2</sup>  
 Productivity Index: 17.85

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 05, 2010 18:07  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** NPS6  
**Cast:** 14

**Latitude:** 35.878  
**Longitude:** -124.023  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 309

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

#### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (µM)	NO2 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l <sup>-1</sup> )
0	1.7	10	16.616	32.654	23.803	92	0.015	0.000	0.489	1.288	5.611
45	45.0	9	15.449	32.734	24.128	91	0.471	0.036	0.586	2.084	5.751
50	49.6	8	14.756	32.737	24.280	92	0.478	0.119	0.612	2.094	5.774
200	200.2	7	8.136	33.846	26.347	94	26.015	0.000	1.912	30.690	3.371
300	303.9	6	7.067	34.012	26.632	94	33.796	0.000	2.447	47.175	1.887
600	607.0	5	4.906	34.224	27.071	94	---	---	---	---	0.295
700	706.0	4	4.542	34.296	27.169	94	43.936	0.009	3.464	102.507	0.194
800	809.2	3	4.224	34.369	27.261	94	44.177	0.008	3.391	101.885	0.208
900	910.8	2	4.038	34.430	27.329	94	44.620	0.009	3.545	113.586	0.320
1010	1017.7	1	3.799	34.469	27.384	94	43.982	0.009	3.466	119.742	0.462

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll a, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **µM** micromole/kg

**Date GMT:** Nov 05, 2010 20:10  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** 67-80  
**Cast:** 15

**Latitude:** 35.793  
**Longitude:** -124.201  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 309

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
0	0.9	12	16.889	32.653	23.740	92	0.024	0.006	0.406	1.072	5.601
5	5.0	11	16.777	32.649	23.763	92	0.026	0.003	0.412	0.490	5.608
10	10.4	10	16.765	32.653	23.768	92	0.026	0.003	0.479	0.280	5.601
20	21.2	9	16.737	32.658	23.778	92	0.027	0.001	0.525	0.265	5.600
30	30.6	8	16.759	32.671	23.783	92	0.075	0.002	0.499	0.235	5.585
40	39.6	7	16.055	32.697	23.964	91	0.073	0.033	0.574	1.410	5.679
60	60.4	6	11.858	32.762	24.877	93	2.452	0.032	0.718	2.709	5.929
80	81.7	5	10.593	32.893	25.206	94	7.704	0.016	0.956	6.207	5.559
100	100.9	4	10.084	33.126	25.475	94	14.985	0.016	1.310	13.624	5.017
150	151.3	3	8.584	33.636	26.115	94	24.223	0.014	1.889	25.824	3.663
200	203.1	2	7.909	33.917	26.437	94	26.893	0.010	2.017	32.647	3.278
1005	1015.0	1	3.807	34.464	27.380	94	44.582	0.013	3.419	122.988	0.439

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.204	0.055	0	100	9.111	44.714	0
5	11	0.233	0.065	10	50	10.554	43.228	10
10	10	0.244	0.067	10	30	10.225	41.881	17
20	9	0.250	0.069	20	15	8.344	33.424	26
30	8	0.285	0.082	30	5	3.553	12.489	38
40	7	0.520	0.311	60	1	0.455	3.262	55
60	6	0.140	0.123	80	0.1	0.014	0.340	98
80	5	0.042	0.048					
100	4	0.017	0.032					
150	3	0.006	0.020					
200	2	0.005	0.016					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 13.03 mg m<sup>-2</sup>  
 Phaeophytin: 4.36 mg m<sup>-2</sup>

Carbon Fixation: 359.68 mg m<sup>-2</sup>  
 Productivity Index: 27.61

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 05, 2010 22:47  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** NPS7  
**Cast:** 16

**Latitude:** 35.709  
**Longitude:** -124.378  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 309

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

#### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (µM)	NO2 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l <sup>-1</sup> )
0	1.5	12	16.919	32.629	23.715	92	0.018	0.002	0.443	0.795	5.587
50	49.8	11	16.199	32.741	23.966	91	0.008	0.004	0.407	0.753	5.740
100	100.3	10	10.833	32.976	25.229	94	6.325	0.000	0.794	5.532	5.456
200	202.5	9	8.114	33.882	26.379	94	26.458	0.000	1.911	30.570	3.307
305	305.2	8	6.842	34.010	26.660	94	34.485	0.000	2.484	49.220	1.840
405	406.5	7	6.035	34.080	26.821	94	---	---	---	---	0.955
500	504.6	6	5.567	34.173	26.953	94	40.753	0.000	3.099	80.411	0.493
605	608.5	5	4.897	34.225	27.073	94	43.214	0.000	3.269	92.461	0.299
700	708.8	4	4.601	34.286	27.154	94	44.105	0.003	3.355	101.073	0.196
805	810.0	3	4.337	34.371	27.251	94	---	---	---	---	0.198
900	910.8	2	4.077	34.438	27.331	94	43.977	0.003	3.332	116.417	0.329
1005	1014.0	1	3.832	34.466	27.379	94	44.615	0.003	3.471	120.959	0.441

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll a, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **µM** micromole/kg

**Date GMT:** Nov 06, 2010 00:53  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** 67-85  
**Cast:** 17

**Latitude:** 35.625  
**Longitude:** -124.554  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 310

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
0	2.2	12	17.272	32.795	23.759	93	0.053	0.001	0.346	1.726	5.529
5	5.3	11	17.264	32.795	23.760	93	0.000	0.000	0.394	1.369	5.524
10	10.3	10	17.221	32.792	23.768	93	0.000	0.000	0.383	1.204	5.517
20	20.1	9	17.202	32.790	23.771	93	0.000	0.000	0.432	1.087	5.515
30	31.1	8	17.211	32.797	23.775	93	0.000	0.000	0.473	1.140	5.517
40	40.6	7	16.591	32.841	23.953	92	0.000	0.000	0.394	0.817	5.674
60	60.6	6	13.109	32.895	24.741	93	0.404	0.000	0.550	2.046	5.971
80	79.9	5	11.631	32.901	25.027	94	2.817	0.023	0.709	3.543	5.692
100	101.8	4	11.101	33.092	25.272	94	6.524	0.019	0.818	5.638	5.364
150	153.2	3	8.651	33.606	26.081	94	23.200	0.015	1.771	23.597	3.748
200	202.2	2	8.117	33.930	26.416	94	27.622	0.025	2.129	32.652	3.086
1000	1011.7	1	3.777	34.455	27.375	94	44.780	0.022	3.543	123.409	0.381

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.141	0.033	0	100	6.337	44.834	0
5	11	0.138	0.035	10	50	6.553	47.913	12
10	10	0.137	0.042	10	30	6.550	47.892	21
20	9	0.159	0.042	20	15	3.146	19.810	31
30	8	0.209	0.054	30	5	2.363	11.293	44
40	7	0.351	0.138	60	1	0.342	1.271	62
60	6	0.269	0.247	80	0.1	0.000	0.000	97
80	5	0.091	0.105					
100	4	0.054	0.068					
150	3	0.006	0.019					
200	2	0.004	0.017					
1000	1	0.003	0.008					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 11.18 mg m<sup>-2</sup>  
Phaeophytin: 4.62 mg m<sup>-2</sup>

Carbon Fixation: 245.32 mg m<sup>-2</sup>  
Productivity Index: 21.95

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 06, 2010 03:06  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** NPS8  
**Cast:** 18

**Latitude:** 35.544  
**Longitude:** -124.729  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 310

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

#### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (µM)	NO2 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l <sup>-1</sup> )
0	1.5	12	16.784	32.645	23.758	92	0.055	0.011	0.491	1.132	5.571
50	50.1	11	14.075	32.732	24.419	91	0.002	0.007	0.518	1.643	5.902
100	101.6	10	10.605	33.032	25.313	94	11.092	0.014	1.140	10.549	5.194
200	200.8	9	8.127	33.917	26.404	94	28.285	0.010	2.077	35.925	3.025
300	303.9	8	6.663	33.999	26.676	94	34.388	0.021	2.574	54.241	1.834
405	406.5	7	6.155	34.141	26.854	94	38.720	0.000	2.953	70.750	0.741
500	505.9	6	5.289	34.174	26.987	94	41.263	0.000	3.145	87.453	0.497
600	607.2	5	5.102	34.281	27.094	94	40.120	0.000	3.132	91.219	0.220
700	708.5	4	4.650	34.337	27.189	94	43.515	0.004	3.371	108.641	0.172
805	812.4	3	4.263	34.384	27.269	94	44.082	0.000	3.331	117.177	0.196
905	913.6	2	4.049	34.426	27.325	94	42.466	0.056	3.413	117.635	0.297
1005	1012.5	1	3.802	34.459	27.376	94	43.754	0.021	3.562	126.593	0.402

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll a, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **µM** micromole/kg

**Date GMT:** Nov 06, 2010 04:58      **Cruise:** S510      **Latitude:** 35.461      **Year:** 2010  
**Project:** PACOOS      **Station:** 67-90      **Longitude:** -124.905      **Work week:** 45  
**Platform:** POINT SUR      **Cast:** 19      **Secchi Depth:** ---      **Day of Year:** 310

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (µM)	NO2 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l <sup>-1</sup> )
0	1.3	12	16.687	32.640	23.777	92	0.056	0.003	0.364	0.919	5.614
5	5.3	11	16.684	32.640	23.777	92	0.019	0.036	0.556	0.609	5.635
10	9.8	10	16.649	32.649	23.792	91	0.129	0.050	0.642	0.023	5.640
20	20.4	9	16.722	32.677	23.797	92	0.048	0.041	0.511	0.516	5.611
30	30.5	8	16.788	32.700	23.799	92	0.139	0.023	0.471	0.666	5.592
40	40.9	7	16.429	32.652	23.845	91	0.113	0.044	0.557	0.971	5.619
60	62.2	6	12.861	32.831	24.740	93	1.047	0.187	0.595	2.565	5.894
80	81.2	5	11.666	32.887	25.010	93	3.423	0.047	0.842	4.097	5.700
100	101.2	4	10.819	32.977	25.233	94	11.230	0.000	1.087	10.612	5.422
150	151.6	3	8.821	33.498	25.970	94	21.661	0.013	1.746	22.503	4.014
200	202.2	1	8.296	33.886	26.355	94	26.563	0.030	1.984	31.654	3.249
200	202.4	2	8.295	33.886	26.355	94	26.003	0.007	1.939	30.702	3.244

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.204	0.052	0	100	10.912	53.550	0
5	11	0.213	0.066	10	50	11.131	48.901	10
10	10	0.228	0.058	10	30	10.522	46.226	17
20	9	0.264	0.060	20	15	7.678	29.047	26
30	8	0.316	0.097	30	5	2.897	9.176	38
40	7	0.480	0.198	60	1	0.919	4.086	55
60	6	0.225	0.220	80	0.1	0.000	0.000	88
80	5	0.084	0.100					
100	4	0.028	0.040					
150	3	0.007	0.020					
200	1	0.012	0.020					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 14.17 mg m<sup>-2</sup>      Carbon Fixation: 365.79 mg m<sup>-2</sup>  
 Phaeophytin: 5.16 mg m<sup>-2</sup>      Productivity Index: 25.82

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, µM micromole/kg

**Date GMT:** Nov 06, 2010 06:33  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** 67-90  
**Cast:** 21

**Latitude:** 35.461  
**Longitude:** -124.913  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 310

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

#### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (µM)	NO2 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l <sup>-1</sup> )
500	506.3	12	5.363	34.134	26.946	94	41.150	0.026	3.104	84.807	0.721
750	758.4	11	4.548	34.342	27.204	94	43.840	0.008	3.318	109.334	0.252
1000	1011.4	10	3.857	34.454	27.367	94	44.302	0.000	3.422	126.170	0.451
1505	1523.0	9	2.766	34.553	27.549	94	43.299	0.000	3.274	150.992	1.008
2005	2027.3	8	2.099	34.608	27.650	94	42.513	0.006	3.052	170.884	1.589
2510	2542.2	7	1.777	34.645	27.705	94	39.561	0.003	2.739	170.075	2.147
3000	3042.4	6	1.618	34.662	27.731	94	38.372	0.000	2.460	163.219	2.502
3010	3054.0	5	1.615	34.662	27.731	94	39.383	0.000	2.913	176.475	2.511
3510	3563.2	4	1.523	34.675	27.748	94	38.329	0.028	3.042	175.936	2.846
4010	4077.0	3	1.491	34.684	27.757	94	38.886	0.004	2.982	173.430	3.180
4265	4341.1	2	1.510	34.685	27.757	94	37.472	0.011	2.672	167.202	3.271
4270	4342.9	1	1.510	34.686	27.757	94	37.582	0.000	2.720	167.072	3.281

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll a, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **µM** micromole/kg

**Date GMT:** Nov 06, 2010 12:08      **Cruise:** S510      **Latitude:** 35.706      **Year:** 2010  
**Project:** PACOOS      **Station:** 65.25-90      **Longitude:** -125.090      **Work week:** 45  
**Platform:** POINT SUR      **Cast:** 22      **Secchi Depth:** ---      **Day of Year:** 310

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

**Physical and Chemical**

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (µM)	NO2 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l <sup>-1</sup> )
0	0.6	7	17.438	32.877	23.782	92	0.000	0.000	0.245	1.278	5.406
50	52.0	6	14.483	32.838	24.416	92	---	---	---	---	5.907
200	203.8	5	8.345	33.825	26.300	93	25.553	0.000	1.686	29.391	3.300
500	505.1	4	5.720	34.201	26.956	93	41.153	0.018	3.090	90.600	0.481
805	812.1	3	4.233	34.365	27.256	94	43.140	0.007	3.198	110.343	0.225
905	913.4	2	3.947	34.418	27.329	94	42.979	0.021	3.273	118.338	0.320
1005	1013.3	1	3.725	34.453	27.379	94	43.140	0.023	3.329	124.210	0.434

\* **Abbreviations:** **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll a, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **µM** micromole/kg

**Date GMT:** Nov 06, 2010 15:52      **Cruise:** S510      **Latitude:** 36.005      **Year:** 2010  
**Project:** PACOOS      **Station:** 63.5-90      **Longitude:** -125.319      **Work week:** 45  
**Platform:** POINT SUR      **Cast:** 23      **Secchi Depth:** ---      **Day of Year:** 310

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
0	0.6	12	17.481	32.824	23.731	88	0.065	0.106	0.735	2.468	5.248
5	5.9	11	17.479	32.824	23.732	88	1.104	0.031	0.613	1.551	5.417
10	10.6	10	17.475	32.824	23.733	88	1.141	0.303	0.841	11.523	5.708
20	22.1	9	17.437	32.819	23.738	88	1.159	0.034	0.507	1.564	5.838
30	32.2	8	17.417	32.818	23.742	88	1.126	0.037	0.723	1.614	5.881
40	41.5	7	17.491	32.859	23.755	88	0.006	0.013	0.582	1.526	5.901
60	61.4	6	15.040	32.912	24.354	88	0.155	0.054	0.681	2.147	6.282
80	81.1	5	13.720	33.056	24.743	88	0.318	0.104	0.704	2.451	6.280
100	102.9	4	13.062	33.131	24.933	89	0.372	0.182	0.476	2.712	6.135
150	151.2	3	10.375	33.270	25.538	89	16.495	0.022	1.392	15.317	5.407
200	201.8	2	8.754	33.683	26.126	89	21.679	0.038	1.745	22.959	3.993
1005	1013.1	1	3.788	34.458	27.377	89	44.915	0.025	3.561	123.799	0.449

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.165	0.047	0	100	3.849	23.376	0
5	11	0.165	0.048	10	50	3.716	23.133	11
10	10	0.161	0.049	20	30	3.487	21.108	19
20	9	0.165	0.047	30	15	3.184	17.261	30
30	8	0.184	0.055	40	5	2.762	11.990	45
40	7	0.230	0.078	60	1	0.324	23.568	65
60	6	0.014	0.424	100	0.1	0.204	20.193	94
80	5	0.015	0.389					
100	4	0.010	0.309					
150	3	0.013	0.030					
200	2	0.005	0.019					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 10.61 mg m<sup>-2</sup>      Carbon Fixation: 183.56 mg m<sup>-2</sup>  
 Phaeophytin: 7.49 mg m<sup>-2</sup>      Productivity Index: 17.30

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 06, 2010 19:09  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** 61.75-90  
**Cast:** 24

**Latitude:** 36.310  
**Longitude:** -125.541  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 310

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
0	0.6	10	17.575	32.790	23.683	88	0.000	0.020	0.465	1.283	5.643
5	5.3	9	17.571	32.790	23.683	88	0.000	0.060	0.439	1.310	5.508
10	9.5	8	17.543	32.789	23.689	88	0.045	0.099	0.519	1.347	5.171
15	15.2	7	17.543	32.796	23.695	88	0.035	0.099	0.605	1.710	5.474
20	21.8	6	17.575	32.826	23.710	88	0.000	0.055	0.721	2.123	5.823
40	39.7	5	17.532	32.885	23.766	88	---	---	---	---	5.894
55	57.6	4	15.603	32.874	24.201	88	---	---	---	---	6.255
100	99.6	3	12.388	32.955	24.927	89	---	---	---	---	5.903
200	202.5	2	8.658	33.735	26.181	89	23.295	0.030	1.850	25.674	3.899
1005	1013.0	1	3.768	34.446	27.369	89	45.782	0.022	3.540	130.469	0.387

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
200	2	0.003	0.016	10	50	2.561	---	12
				20	30	2.719	---	20
				30	15	2.212	---	32
				40	5	1.261	---	46
				60	1	0.162	---	67
				100	0.1	0.000	---	119

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 13.78 mg m<sup>-2</sup>  
Phaeophytin: 4.28 mg m<sup>-2</sup>

Carbon Fixation: 121.46 mg m<sup>-2</sup>  
Productivity Index: 8.82

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 06, 2010 22:48  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** 60-90  
**Cast:** 25

**Latitude:** 36.613  
**Longitude:** -125.770  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 45  
**Day of Year:** 310

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
0	1.8	12	17.384	32.693	23.654	88	0.023	0.028	0.484	1.672	5.809
5	4.9	11	17.387	32.693	23.653	88	0.000	0.000	0.445	1.227	5.627
10	10.1	10	17.386	32.692	23.653	88	0.015	0.013	0.461	1.048	5.376
20	20.4	9	17.278	32.679	23.668	88	0.007	0.000	0.444	1.035	5.508
30	30.1	7	17.011	32.619	23.685	88	0.026	0.025	0.503	0.728	5.901
30	30.7	8	16.809	32.584	23.705	87	0.039	0.000	0.417	0.634	5.856
40	39.3	6	16.431	32.508	23.734	87	0.041	0.019	0.604	0.150	6.023
60	59.3	5	13.809	32.865	24.577	87	0.254	0.073	0.659	2.021	6.208
80	80.7	4	11.888	32.865	24.952	88	2.519	0.046	0.741	3.326	6.484
100	100.3	3	10.847	32.888	25.158	89	5.119	0.026	0.793	5.253	6.030
150	151.4	2	8.826	33.389	25.884	89	17.039	0.008	1.456	17.876	4.703
200	201.7	1	8.400	33.853	26.314	89	28.813	0.005	2.323	35.083	3.037

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.131	0.031	0	100	2.899	22.085	0
5	11	0.128	0.036	10	50	2.784	22.977	12
10	10	0.121	0.034	10	30	2.294	18.936	21
20	9	0.146	0.037	20	15	1.955	13.399	32
30	8	0.136	0.032	40	5	4.558	15.918	45
30	7	0.185	0.048	60	1	1.081	0.981	58
40	6	0.286	0.081	80	0.1	0.252	1.558	76
60	5	1.101	0.664					
80	4	0.162	0.129					
100	3	0.060	0.064					
150	2	0.006	0.020					
200	1	0.004	0.030					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 15.74 mg m<sup>-2</sup>  
Phaeophytin: 6.64 mg m<sup>-2</sup>

Carbon Fixation: 157.72 mg m<sup>-2</sup>  
Productivity Index: 10.02

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 06, 2010 23:58      **Cruise:** S510      **Latitude:** 36.615      **Year:** 2010  
**Project:** PACOOS      **Station:** 60-90      **Longitude:** -125.772      **Work week:** 45  
**Platform:** POINT SUR      **Cast:** 26      **Secchi Depth:** ---      **Day of Year:** 310

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

#### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (µM)	NO2 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l <sup>-1</sup> )
505	507.0	12	5.143	34.106	26.950	89	43.072	0.003	3.087	86.561	0.808
750	757.2	11	4.295	34.311	27.207	89	45.774	0.000	3.521	114.829	0.232
1000	1010.2	10	3.702	34.453	27.381	89	---	---	---	---	0.435
1500	1514.7	9	2.600	34.553	27.564	89	45.346	0.000	3.448	161.948	1.103
2000	2022.7	8	1.972	34.614	27.665	89	43.125	0.000	3.232	176.675	1.872
2500	2534.8	7	1.740	34.648	27.710	89	41.745	0.011	3.131	182.203	2.484
2995	3040.8	5	1.600	34.666	27.735	89	40.805	0.013	3.092	181.381	2.951
3000	3042.8	6	1.601	34.666	27.735	89	40.177	0.013	2.917	178.026	2.953
3495	3550.0	4	1.525	34.678	27.750	89	39.949	0.000	3.019	177.482	3.310
3995	4063.7	3	1.502	34.686	27.758	89	39.239	0.000	2.757	180.648	3.621
4355	4435.1	1	1.524	34.688	27.758	89	38.676	0.000	2.867	172.972	3.749
4355	4435.5	2	1.524	34.688	27.758	89	38.932	0.000	2.923	171.776	3.765

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll a, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **µM** micromole/kg

**Date GMT:** Nov 07, 2010 05:06  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** 60-85  
**Cast:** 27

**Latitude:** 36.781  
**Longitude:** -125.410  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 46  
**Day of Year:** 311

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
0	1.6	12	15.629	32.388	23.822	87	0.321	0.022	0.439	1.005	5.770
5	4.9	11	15.629	32.388	23.822	87	0.005	0.009	0.521	0.482	6.005
10	9.8	10	15.628	32.387	23.822	87	0.001	0.006	0.486	0.328	6.162
20	20.7	9	15.398	32.385	23.871	87	0.004	0.017	0.578	1.098	6.213
30	30.7	8	15.307	32.386	23.891	87	0.023	0.012	0.497	0.976	6.234
40	40.3	7	14.759	32.534	24.123	86	0.076	0.040	0.533	1.376	6.322
60	60.0	6	11.784	32.647	24.802	88	2.175	0.137	0.702	2.344	6.408
80	79.9	5	10.156	32.739	25.161	89	7.069	0.012	0.824	5.929	5.920
100	102.5	4	9.388	32.926	25.433	89	10.984	0.056	1.267	10.320	5.471
150	151.4	3	8.273	33.546	26.092	89	23.126	0.023	1.823	27.504	3.987
200	200.7	2	8.354	33.987	26.425	89	31.738	0.013	2.399	39.617	1.946
1000	1010.5	1	3.690	34.448	27.378	89	44.689	0.010	3.484	131.078	0.384

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.197	0.059	0	100	8.371	42.420	0
5	11	0.200	0.059	10	50	8.540	42.678	10
10	10	0.200	0.064	10	30	6.713	33.551	17
20	9	0.270	0.080	20	15	8.012	29.691	26
30	8	0.294	0.090	40	5	1.826	3.515	38
40	7	0.520	0.250	60	1	1.441	7.931	56
60	6	0.182	0.118	80	0.1	0.168	2.084	93
80	5	0.081	0.064					
100	4	0.037	0.038					
150	3	0.005	0.040					
200	2	0.007	0.044					
1000	1	0.003	0.009					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 16.42 mg m<sup>-2</sup>  
Phaeophytin: 6.93 mg m<sup>-2</sup>

Carbon Fixation: 293.96 mg m<sup>-2</sup>  
Productivity Index: 17.90

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 07, 2010 08:48      **Cruise:** S510      **Latitude:** 36.945      **Year:** 2010  
**Project:** PACOOS      **Station:** 60-80      **Longitude:** -125.049      **Work week:** 46  
**Platform:** POINT SUR      **Cast:** 28      **Secchi Depth:** ---      **Day of Year:** 311

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
0	2.5	12	15.807	32.384	23.779	87	0.020	0.004	0.398	0.858	5.805
5	4.6	11	15.811	32.383	23.778	87	0.019	0.032	0.502	0.519	5.526
10	9.7	10	15.809	32.384	23.779	87	0.017	0.009	0.557	0.433	5.835
20	21.3	9	15.556	32.398	23.846	87	0.008	0.008	0.479	0.538	6.215
30	29.0	8	15.004	32.445	24.002	86	0.096	0.052	0.664	1.522	6.286
40	39.8	7	14.488	32.561	24.201	86	0.514	0.088	0.643	1.640	6.316
60	60.5	6	11.418	32.648	24.870	88	3.649	0.044	0.863	3.127	6.178
80	81.6	5	10.252	32.763	25.164	89	5.597	0.028	0.820	4.959	5.903
100	103.2	4	9.169	33.003	25.528	89	12.841	0.020	1.313	12.524	5.250
150	152.6	3	8.035	33.663	26.219	89	25.028	0.017	1.967	30.189	3.853
200	204.1	2	7.573	33.907	26.477	89	29.553	0.036	2.215	40.287	2.751
1000	1011.8	1	3.682	34.460	27.389	89	44.451	0.019	3.602	128.515	0.439

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.199	0.051	0	100	6.074	30.493	0
5	11	0.190	0.049	10	50	6.330	33.642	11
10	10	0.188	0.046	10	30	5.054	26.859	18
20	9	0.229	0.068	20	15	3.771	16.434	26
30	8	0.485	0.223	40	5	6.173	12.010	37
40	7	0.514	0.304	60	1	0.414	2.817	54
60	6	0.147	0.093	80	0.1	0.000	0.000	93
80	5	0.070	0.059					
100	4	0.022	0.030					
150	3	0.005	0.023					
200	2	0.004	0.016					
1000	1	0.001	0.006					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 14.77 mg m<sup>-2</sup>      Carbon Fixation: 253.32 mg m<sup>-2</sup>  
Phaeophytin: 6.70 mg m<sup>-2</sup>      Productivity Index: 17.15

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 07, 2010 12:24      **Cruise:** S510      **Latitude:** 37.114      **Year:** 2010  
**Project:** PACOOS      **Station:** 60-75      **Longitude:** -124.694      **Work week:** 46  
**Platform:** POINT SUR      **Cast:** 29      **Secchi Depth:** ---      **Day of Year:** 311

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (µM)	NO2 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l <sup>-1</sup> )
0	1.6	12	16.000	32.394	23.744	87	0.033	0.151	0.516	0.657	5.525
5	5.3	11	16.003	32.397	23.746	87	0.043	0.010	0.491	0.287	5.724
10	9.3	10	16.002	32.398	23.747	87	0.035	0.021	0.482	0.127	5.990
20	20.3	9	15.981	32.399	23.752	87	0.038	0.015	0.510	0.163	6.081
30	30.3	8	14.931	32.434	24.010	85	0.019	0.062	0.493	1.210	6.295
40	40.9	7	14.300	32.561	24.240	85	0.596	0.114	0.712	1.882	6.327
60	60.8	6	11.542	32.684	24.875	87	1.805	0.266	0.915	2.676	6.243
80	80.7	5	9.701	32.843	25.317	88	7.422	0.033	0.984	6.912	5.641
100	100.6	4	8.941	33.154	25.682	88	15.640	0.044	1.531	15.976	4.843
150	149.4	3	7.889	33.694	26.264	88	24.978	0.018	1.860	30.685	3.676
200	201.1	2	7.322	33.901	26.508	88	28.775	0.012	2.128	40.179	3.098
1005	1012.7	1	3.728	34.463	27.386	88	44.053	0.008	3.544	132.998	0.452

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.173	0.035	0	100	4.563	26.444	0
5	11	0.168	0.047	10	50	4.182	23.978	11
10	10	0.174	0.041	10	30	3.372	19.335	17
20	9	0.436	0.206	20	15	2.492	5.715	24
30	8	0.544	0.289	40	5	1.409	8.825	35
40	7	0.160	0.131	60	1	0.327	6.144	59
60	6	0.053	0.060	80	0.1	0.000	0.000	135
80	5	0.016	0.029					
100	4	0.005	0.019					
150	3	0.003	0.016					
200	2	0.003	0.013					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 10.88 mg m<sup>-2</sup>      Carbon Fixation: 132.95 mg m<sup>-2</sup>  
 Phaeophytin: 5.63 mg m<sup>-2</sup>      Productivity Index: 12.22

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, µM micromole/kg

**Date GMT:** Nov 07, 2010 16:05  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** 60-70  
**Cast:** 30

**Latitude:** 37.280  
**Longitude:** -124.334  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 46  
**Day of Year:** 311

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
0	2.0	12	14.563	32.915	24.459	86	4.035	0.153	0.829	5.368	6.113
5	4.1	11	14.581	32.924	24.462	86	3.943	0.141	0.881	4.973	6.302
10	9.1	10	14.655	32.969	24.481	86	4.556	0.184	0.890	5.782	6.220
20	21.4	9	12.246	33.349	25.261	86	12.437	0.440	1.507	11.378	5.536
30	29.0	8	12.261	33.493	25.370	86	14.097	0.538	1.504	14.363	5.510
40	39.6	7	10.590	33.557	25.724	87	21.590	0.437	1.928	20.036	3.859
60	61.1	6	9.322	33.542	25.926	88	23.195	0.031	1.905	23.940	3.897
80	80.9	5	8.880	33.672	26.097	88	25.189	0.025	1.947	27.947	3.450
100	101.4	4	8.539	33.825	26.270	88	28.050	0.040	2.178	33.673	2.784
150	150.6	3	8.261	33.975	26.430	88	29.707	0.016	2.195	37.882	2.268
200	201.3	2	7.458	34.012	26.576	88	32.815	0.007	2.540	46.551	1.906
995	1007.1	1	3.737	34.461	27.384	88	43.661	0.021	3.510	129.584	0.453

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.539	0.136	0	100	15.431	28.641	0
5	11	0.508	0.136	5	50	14.520	28.606	7
10	10	0.448	0.165	10	30	11.822	26.394	12
20	9	0.679	0.389	20	15	6.481	9.542	18
30	8	0.771	0.461	30	5	2.555	3.314	27
40	7	0.349	0.237	40	1	1.332	3.818	40
60	6	0.044	0.103	60	0.1	0.031	0.713	75
80	5	0.028	0.086					
100	4	0.026	0.079					
150	3	0.010	0.052					
200	2	0.009	0.035					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 23.46 mg m<sup>-2</sup>  
 Phaeophytin: 11.89 mg m<sup>-2</sup>

Carbon Fixation: 290.62 mg m<sup>-2</sup>  
 Productivity Index: 12.39

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 07, 2010 19:47  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** 60-65  
**Cast:** 31

**Latitude:** 37.447  
**Longitude:** -123.971  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 46  
**Day of Year:** 311

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
0	1.1	12	14.784	32.792	24.316	86	1.862	0.085	0.455	3.415	5.746
5	5.7	11	14.562	32.791	24.363	85	1.860	0.107	0.721	3.132	6.158
10	10.5	10	15.064	33.176	24.552	82	2.044	0.116	0.766	3.068	6.402
20	19.6	9	15.015	33.261	24.628	83	2.687	0.101	0.685	3.120	6.311
30	29.0	8	14.581	33.459	24.874	84	4.701	0.351	0.827	2.868	5.915
40	40.3	7	12.080	33.480	25.393	87	15.693	0.070	1.540	10.019	4.486
60	58.2	6	10.477	33.571	25.755	87	21.895	0.027	1.845	18.906	3.549
80	79.5	5	9.369	33.693	26.036	88	---	---	---	---	3.041
100	100.3	4	9.021	33.848	26.213	88	27.088	0.025	2.088	30.190	2.589
150	152.0	3	8.412	33.987	26.416	88	30.429	0.054	2.464	37.606	2.137
200	201.9	2	7.900	34.050	26.542	88	32.340	0.055	2.560	44.269	1.757
1000	1011.8	1	3.714	34.453	27.380	88	44.430	0.004	3.541	131.016	0.401

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	0.432	0.127	0	100	23.534	54.437	0
5	11	0.474	0.124	5	50	22.313	47.113	7
10	10	0.844	0.232	5	30	16.291	34.397	11
20	9	0.826	0.276	10	15	18.359	21.741	17
30	8	0.734	0.342	20	5	8.132	9.844	26
40	7	0.224	0.212	30	1	2.276	3.099	40
60	6	0.073	0.115	40	0.1	0.268	1.197	76
80	5	0.014	0.059					
100	4	0.008	0.043					
150	3	0.004	0.033					
200	2	0.004	0.022					
1000	1	0.002	0.007					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 27.28 mg m<sup>-2</sup>  
Phaeophytin: 9.03 mg m<sup>-2</sup>

Carbon Fixation: 529.10 mg m<sup>-2</sup>  
Productivity Index: 19.40

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 07, 2010 23:14  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** 60-60  
**Cast:** 32

**Latitude:** 37.613  
**Longitude:** -123.611  
**Secchi Depth:** 11 m

**Year:** 2010  
**Work week:** 46  
**Day of Year:** 311

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
5	4.8	11	15.304	32.963	24.336	83	0.869	0.072	0.684	2.841	5.654
10	9.1	10	15.294	32.965	24.340	83	0.943	0.052	0.471	2.685	6.004
10	7.7	12	15.298	32.965	24.339	83	---	---	---	---	5.364
20	20.6	9	15.244	32.999	24.377	83	0.560	0.081	0.605	2.719	6.331
30	30.7	8	15.144	33.115	24.488	84	1.273	0.086	0.579	2.671	6.311
40	39.1	7	13.714	33.191	24.849	85	4.994	0.381	0.839	4.691	6.141
60	60.0	6	10.852	33.149	25.360	88	12.403	0.067	1.304	11.742	5.135
80	80.3	5	9.807	33.442	25.768	88	19.919	0.046	1.759	19.699	4.150
100	102.2	4	8.941	33.576	26.012	88	23.245	0.075	1.966	24.784	3.704
150	152.4	3	8.301	33.816	26.299	88	25.375	0.051	2.039	31.105	3.486
200	201.7	2	7.616	33.959	26.513	88	29.542	0.037	2.315	40.611	2.645
1000	1010.5	1	3.843	34.441	27.357	88	44.033	0.039	3.603	128.104	0.369

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
5	11	0.586	0.148	0	100	41.658	---	0
10	10	0.609	0.162	5	50	38.660	66.019	6
20	9	0.743	0.213	10	30	38.714	63.523	11
30	8	0.366	0.132	10	15	31.079	50.994	17
40	7	0.652	0.373	20	5	13.174	17.720	27
60	6	0.169	0.135	30	1	2.896	7.908	43
80	5	0.032	0.059	40	0.1	0.520	0.798	69
100	4	0.015	0.048					
150	3	0.004	0.028					
200	2	0.004	0.023					
1000	1	0.002	0.008					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 25.70 mg m<sup>-2</sup>  
 Phaeophytin: 7.24 mg m<sup>-2</sup>

Carbon Fixation: 1001.3 mg m<sup>-2</sup>  
 Productivity Index: 38.97

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 08, 2010 02:37  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** 60-57.5  
**Cast:** 33

**Latitude:** 37.698  
**Longitude:** -123.429  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 46  
**Day of Year:** 312

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

#### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (µM)	NO2 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l <sup>-1</sup> )
0	1.2	12	14.046	33.190	24.779	82	6.454	0.219	1.132	7.375	5.954
5	5.3	11	14.060	33.190	24.776	82	6.504	0.249	1.142	7.177	6.271
10	10.6	10	14.053	33.191	24.779	82	6.409	0.258	1.084	6.839	6.459
20	20.9	9	13.908	33.245	24.850	84	6.491	0.262	1.006	6.725	6.480
30	31.0	8	12.609	33.334	25.179	86	10.781	0.554	1.344	10.076	5.669
40	41.4	7	11.829	33.369	25.354	87	13.980	0.577	1.420	12.583	5.261
60	60.6	6	10.304	33.463	25.700	88	20.647	0.088	1.746	18.311	4.141
80	80.9	5	9.806	33.657	25.936	88	24.868	0.093	2.148	24.204	3.228
100	100.3	4	9.139	33.699	26.077	88	26.423	0.067	2.287	28.144	3.156
150	150.5	3	8.374	33.903	26.357	88	29.015	0.049	2.181	35.070	2.572
200	203.3	2	7.747	34.005	26.530	88	30.898	0.071	2.655	40.873	2.252
990	1002.4	1	3.879	34.449	27.361	88	44.123	0.054	3.544	126.999	0.415

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll a, **PHAE0** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **µM** micromole/kg

**Date GMT:** Nov 08, 2010 04:38      **Cruise:** S510      **Latitude:** 37.781      **Year:** 2010  
**Project:** PACOOS      **Station:** 60-55      **Longitude:** -123.246      **Work week:** 46  
**Platform:** POINT SUR      **Cast:** 34      **Secchi Depth:** ---      **Day of Year:** 312

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (µM)	NO2 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l <sup>-1</sup> )
0	1.4	12	13.751	33.101	24.771	81	6.846	0.248	0.928	7.765	6.317
5	4.8	11	13.748	33.101	24.772	81	7.006	0.487	1.003	7.405	6.508
10	10.8	10	13.656	33.110	24.797	82	7.171	0.266	1.061	7.588	6.352
20	20.3	9	11.812	33.425	25.401	86	13.672	0.590	1.474	11.369	5.169
30	29.9	8	10.895	33.388	25.539	87	17.373	0.245	1.329	14.758	4.810
40	38.6	7	10.428	33.420	25.646	87	19.260	0.123	1.722	17.258	4.436
60	61.0	6	10.047	33.751	25.969	85	25.249	0.195	2.081	27.356	2.971
80	81.4	5	9.968	33.796	26.017	84	25.733	0.165	2.377	30.030	2.768
100	101.8	4	9.852	33.830	26.063	84	26.471	0.208	2.451	31.799	2.671
120	120.9	1	9.624	33.890	26.148	83	28.638	0.300	2.799	34.662	2.578
120	119.5	2	9.662	33.878	26.133	83	28.470	0.232	2.693	34.950	2.556
120	119.5	3	9.665	33.877	26.131	83	27.511	0.235	2.354	33.366	2.571

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	1.010	0.325	0	100	59.612	59.042	0
5	11	0.863	0.266	5	50	74.649	86.521	5
10	10	0.973	0.319	10	30	70.901	72.873	9
20	9	0.505	0.210	10	15	50.456	51.860	15
30	8	0.249	0.171	20	5	4.109	8.140	25
40	7	0.136	0.109	30	1	2.385	9.586	46
60	6	0.032	0.144	40	0.1	0.303	2.233	82
80	5	0.042	0.245					
100	4	0.040	0.233					

### Integrated Values

Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll a: 29.40 mg m<sup>-2</sup>  
Phaeophytin: 11.18 mg m<sup>-2</sup>

Carbon Fixation: 1322.5 mg m<sup>-2</sup>  
Productivity Index: 44.99

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll a, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, µM micromole/kg

**Date GMT:** Nov 08, 2010 06:26  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** 60-52.5  
**Cast:** 35

**Latitude:** 37.865  
**Longitude:** -123.066  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 46  
**Day of Year:** 312

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

#### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (μM)	NO2 (μM)	PO4 (μM)	SIO4 (μM)	O2 (ml l <sup>-1</sup> )
0	2.4	12	13.351	33.313	25.016	79	3.461	0.283	1.364	13.789	6.900
5	5.9	11	13.349	33.312	25.016	79	3.485	0.289	1.333	13.649	7.401
10	9.9	10	12.914	33.340	25.124	82	5.536	0.312	1.487	13.923	6.896
20	20.0	9	11.572	33.359	25.394	86	13.773	0.351	1.510	16.144	5.452
30	28.3	8	10.759	33.283	25.481	87	15.753	0.251	1.557	15.040	5.112
40	41.0	7	10.302	33.376	25.633	87	18.387	0.158	1.771	17.084	4.628
60	59.9	6	10.511	33.696	25.847	87	24.610	0.143	2.185	24.011	3.309
80	80.4	1	9.960	33.820	26.037	74	---	---	---	---	2.685
80	81.3	2	9.958	33.820	26.038	73	---	---	---	---	2.676
80	81.8	3	9.958	33.820	26.037	74	---	---	---	---	2.663
80	80.9	4	9.959	33.820	26.037	74	---	---	---	---	2.648
80	80.7	5	9.959	33.820	26.037	74	28.660	0.449	2.841	47.735	2.579

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll a, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **μM** micromole/kg

**Date GMT:** Nov 08, 2010 07:36  
**Project:** PACOOS  
**Platform:** POINT SUR

**Cruise:** S510  
**Station:** 60-50  
**Cast:** 36

**Latitude:** 37.898  
**Longitude:** -122.995  
**Secchi Depth:** ---

**Year:** 2010  
**Work week:** 46  
**Day of Year:** 312

\* Note: Latitude and Longitude are reported in decimal degrees. '---' signifies no data.

### Physical and Chemical

DEP (m)	PRESS (dbar)	BTL #	TEMP (°C)	SAL	SIGMA T	TRANSMISS (%)	NO3 (µM)	NO2 (µM)	PO4 (µM)	SIO4 (µM)	O2 (ml l <sup>-1</sup> )
0	2.3	12	13.995	33.275	24.856	82	5.371	0.204	0.900	7.961	6.257
5	4.8	11	13.999	33.276	24.855	82	5.309	0.173	1.064	8.386	6.441
10	10.1	10	13.988	33.275	24.857	82	5.354	0.202	1.064	8.197	6.553
20	20.7	9	12.730	33.560	25.330	84	11.388	0.466	1.543	9.955	5.677
30	29.4	8	12.030	33.567	25.470	86	16.214	0.572	1.813	15.796	4.571
40	40.2	7	10.917	33.667	25.752	87	22.216	0.568	2.194	18.962	3.513
65	64.7	1	10.352	33.773	25.934	76	26.319	0.392	2.455	37.420	3.089
65	65.4	2	10.353	33.774	25.934	76	26.505	0.433	2.555	38.129	3.063
65	65.5	3	10.353	33.773	25.934	76	26.491	0.431	2.653	37.844	3.030
65	65.4	4	10.354	33.773	25.934	76	26.528	0.440	2.527	38.207	3.008
65	65.5	5	10.354	33.773	25.934	75	26.561	0.441	2.409	37.253	2.964
65	63.2	6	10.353	33.772	25.933	76	26.275	0.434	2.457	36.147	2.694

### Biological

DEP (m)	BTL #	CHL (mg m <sup>-3</sup> )	PHAEAO (mg m <sup>-3</sup> )	DEPTH (m)	% S. I.	PRIMARY PRODUCTION (mg m <sup>-3</sup> )	PROD INDEX (carbon/chl ratio)	LIGHT DEPTH (m)
0	12	1.900	0.400	0	100	106.082	55.834	0
5	11	2.093	0.396	5	50	132.061	63.105	4
10	10	2.258	0.429	10	30	102.870	45.559	7
20	9	2.175	0.762	10	15	71.711	31.760	11
30	8	1.230	0.579	20	5	38.188	17.555	16
40	7	0.387	0.291	30	1	3.973	3.230	25
65	5	0.257	1.095	40	0.1	0.670	1.729	41

### Integrated Values

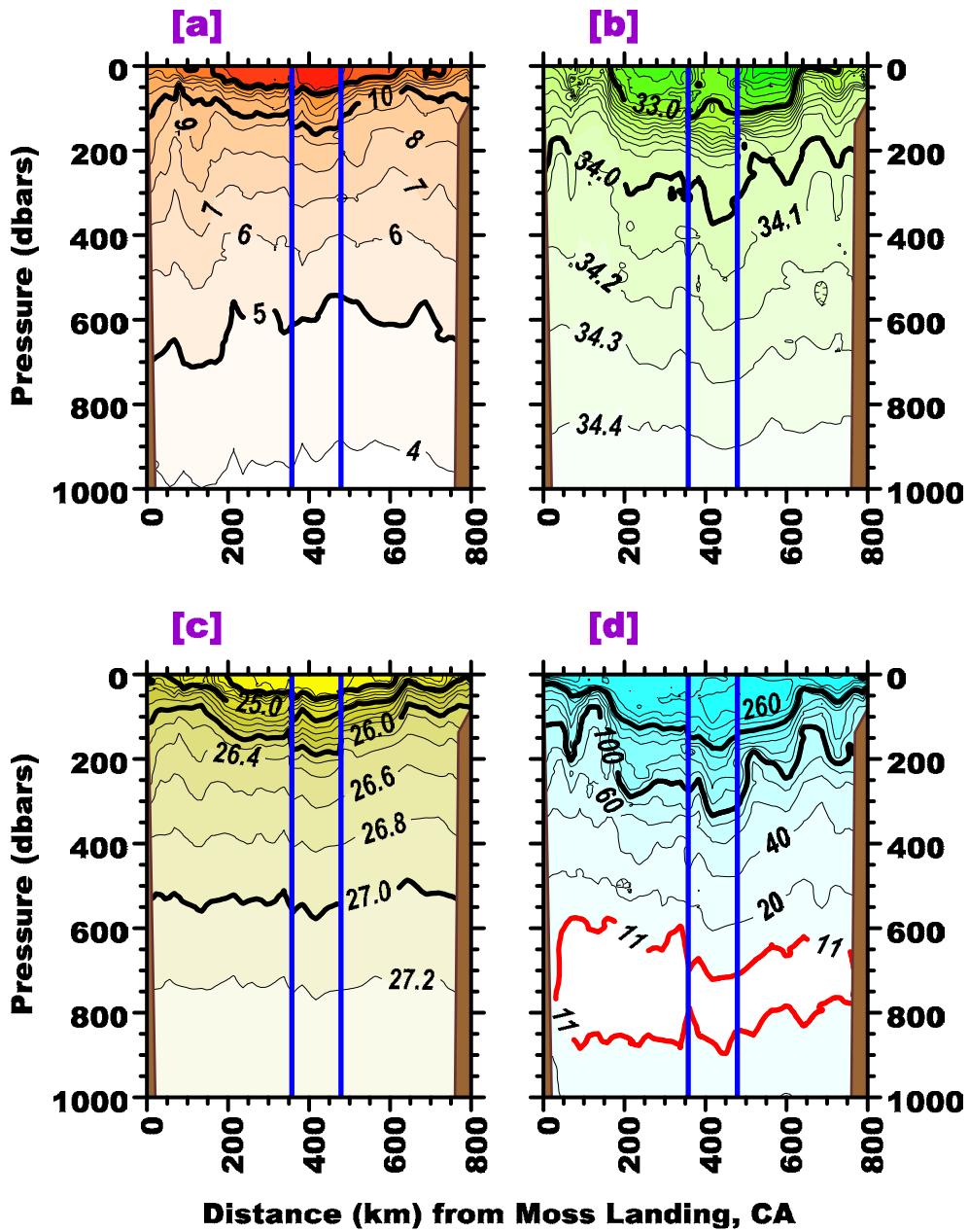
Integrated to 1.0% of Surface Intensity (S.I.)

Chlorophyll *a*: 50.73 mg m<sup>-2</sup>  
 Phaeophytin: 13.82 mg m<sup>-2</sup>

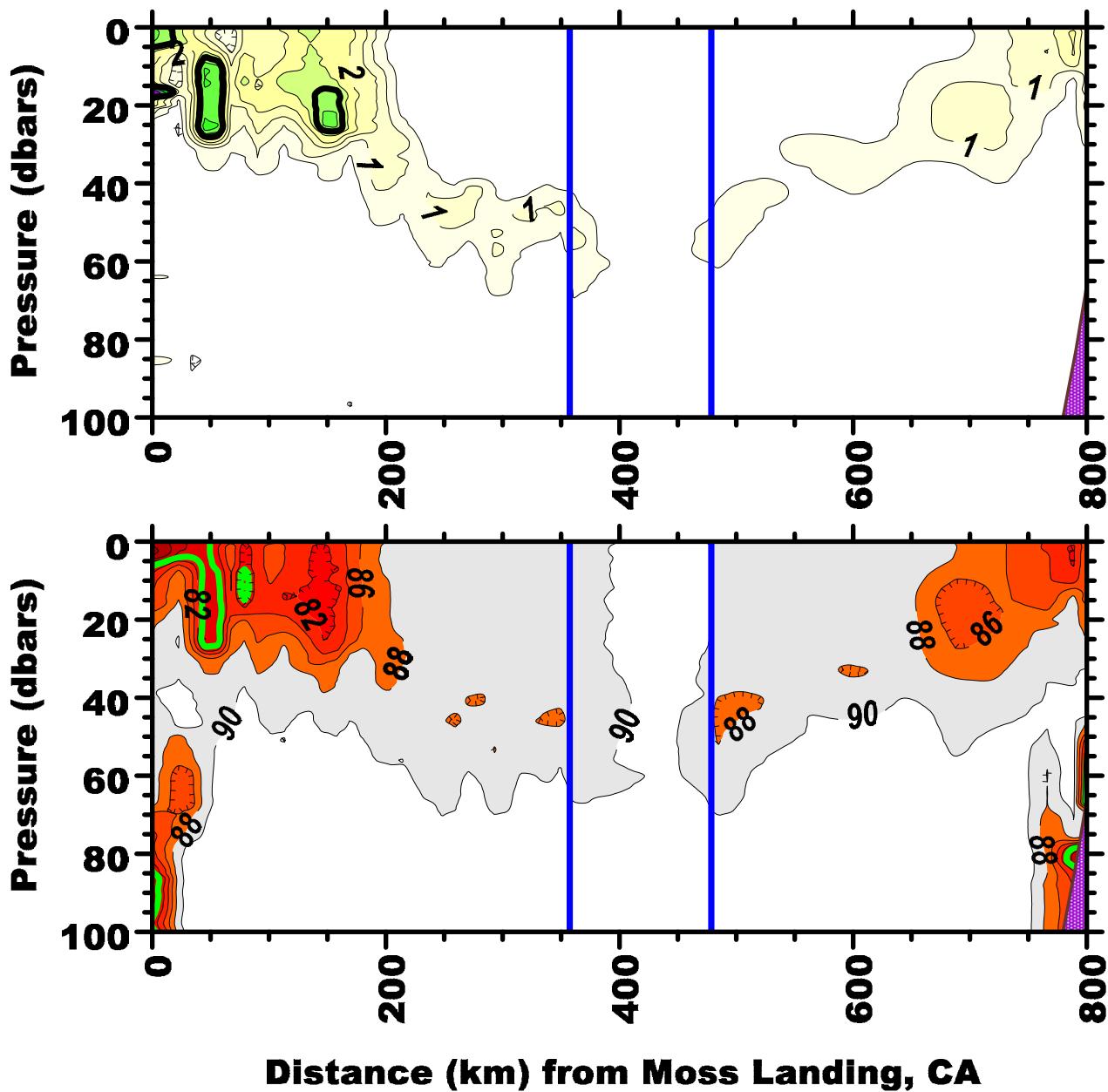
Carbon Fixation: 1643.1 mg m<sup>-2</sup>  
 Productivity Index: 32.39

\* Abbreviations: **DEP** Depth, **PRESS** Pressure, **BTL** Bottle, **TEMP** Temperature, **SAL** Salinity, **TRANSMISS** Transmissivity, **S.I.** Surface Intensity, **CHL** Chlorophyll *a*, **PHAEAO** Phaeophytin, **PROD INDEX** Productivity Index, **O2** Oxygen, **µM** micromole/kg

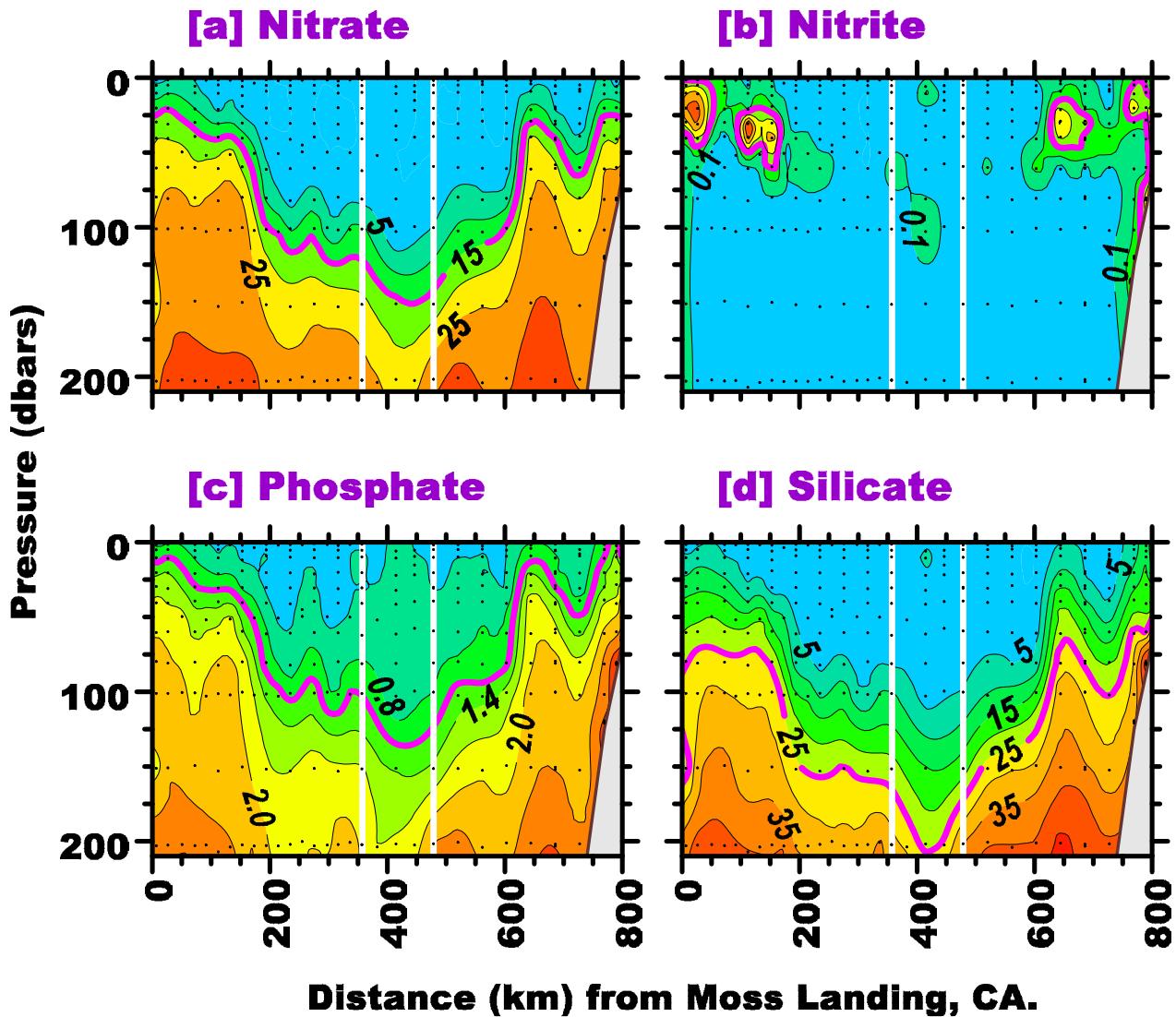
## Appendix B



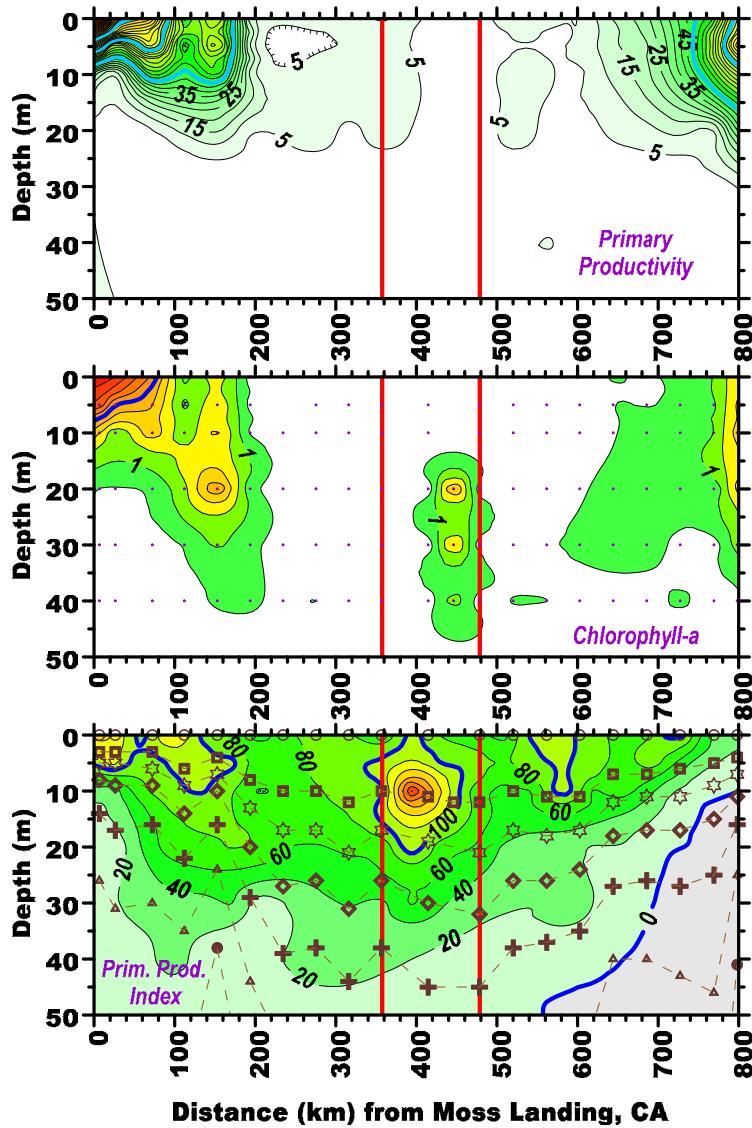
**Figure 12:** Contours of (a) temperature ( $^{\circ}\text{C}$ ), (b) salinity, (c) density anomaly ( $\text{kg m}^{-3}$ ), and (d) oxygen ( $\mu\text{mol kg}^{-1}$ ) fields along the line of hydrographic stations from Moss Landing, California (on the left) to Drakes Bay, California (on the right). The blue lines indicate (from left to right) the turning points at CalCOFI 67-90 and 60-90. Contour intervals for panels a-d are 1  $^{\circ}\text{C}$ , 0.1, 0.2  $\text{kg m}^{-3}$ , and 20  $\mu\text{mol kg}^{-1}$ , respectively, except that the (nearly) oxygen minimum contour of 11  $\mu\text{mol kg}^{-1}$  is highlighted in red in panel d. Other highlighted contours are 5 $^{\circ}$ , 10 $^{\circ}$ , and 15  $^{\circ}\text{C}$  (upper left), 33 and 34 (upper right), 24, 25, 26, and 27  $\text{kg m}^{-3}$  (lower left), and 100 and 200  $\mu\text{mol kg}^{-1}$  (lower right).



**Figure 13:** Contours of fluorescence ( $\mu\text{g l}^{-1}$ ) [top] and transmissivity (percentage) [bottom] in the upper 100 dbars of the water column along the line of hydrographic stations from Moss Landing, California (on the left) to Drakes Bay, California (on the right). The blue lines indicate (from left to right) the turning points at CalCOFI 67-90 and 60-90. The contour intervals are  $0.5 \mu\text{g l}^{-1}$  for the top panel and 2 percent for the bottom panel.  $3 \mu\text{g l}^{-1}$  (top) and 80% (bottom) contours are highlighted. Hatched contours indicate “depressions.”



**Figure 14:** Contours of (a) nitrate ( $\mu\text{M}$ ), (b) nitrite ( $\mu\text{M}$ ), (c) phosphate ( $\mu\text{M}$ ), and (d) silicate ( $\mu\text{M}$ ) fields along the line of hydrographic stations from Moss Landing, California (on the left) to Drakes Bay, California (on the right). The white lines indicate (from left to right) the turning points at CalCOFI 67-90 and 60-90. The dots indicate the water sample locations. Contour intervals for panels a-d are 5 $\mu\text{M}$ , 0.1 $\mu\text{M}$ , 0.3 $\mu\text{M}$ , and 5 $\mu\text{M}$ , respectively. Highlighted contours are 15 $\mu\text{M}$ , 0.3 $\mu\text{M}$ , 1.1 $\mu\text{M}$ , and 25 $\mu\text{M}$  for panels a-d, respectively.



**Figure 15:** *Contours of primary productivity (mg Carbon m<sup>-3</sup>) [top], chlorophyll-a (mg m<sup>-3</sup>) [middle], and primary productivity index (ratio of mg Carbon m<sup>-3</sup> to mg Chlorophyll-a m<sup>-3</sup>) [bottom] in the upper 50 m of the water column along the line of hydrographic stations from Moss Landing, California (on the left) to Drakes Bay, California (on the right). The red lines indicate (from left to right) the turning points at CalCOFI 67-90 and 60-90. Dots [middle] indicate the water sample locations for chl-a. Primary productivity samples are taken by the percentage of the surface light intensity level (light penetration depth). (Light penetration) depths of those light intensity levels are shown [bottom] by the various symbols, with like symbols connected by dashed lines. (100% = open circles, 50% = open squares, 30% = open stars, 15% = open diamonds, 5% = plusses, 1% = open triangles, 0.1% = filled circles.) The contour intervals are 5 mg C m<sup>-3</sup>, 0.5 mg m<sup>-3</sup>, and 20, respectively, for the top, middle, and bottom panels, except that the 0 contour is included and highlighted in the lower panel. Other highlighted contours are 50, 100, and 150 mg C m<sup>-3</sup> [top], 3 mg m<sup>-3</sup> [middle], and 100 [bottom].*

## Appendix C

The following is the introduction from the manual for the SeaTech transmissometer that was mounted on the CTD during the PaCOOS cruise of July 2010.

The Sea Tech 25 cm pathlength transmissometer has been designed to provide accurate in situ measurements of beam transmission and the concentration of suspended matter in relatively clear waters.

The two basic processes that alter the underwater distribution of light are absorption and scattering. Absorption is a change of light energy into other forms of energy whereas scattering entails a change in direction of the light without loss of energy.

In a pure absorbing medium, the loss of light due to absorption in a well-collimated beam of monochromatic light will be given by  $I(z) = I(0)e^{-az}$ , where "a" is the absorption coefficient with units of  $m^{-1}$ . Similarly, in a pure scattering medium, the light redirected from a well-collimated beam of monochromatic light will be given by  $I(z) = I(0)e^{-bz}$ , where "b" is the volume scattering coefficient with units of  $m^{-1}$ . Since attenuation is defined as the sum of absorption and scattering, we get  $a + b = c$ , where "c" is the beam attenuation coefficient.

The light lost from a well-collimated monochromatic beam of light in a scattering and absorbing medium is thus given by  $I(z) = I(0)e^{-cz}$ . This can be rewritten as  $T(z) = I(z)/I(0) = e^{-cz}$ , where  $T(z)$  is the percent light transmitted over a distance, "z". It should be noted that transmission is always over a given distance, whereas the beam attenuation coefficient, "c", is independent of distance. "c" is computed by  $-\ln(T)/z$ , where  $z$  is the pathlength of the instrument.

The simple exponential relationship holds only if the light is monochromatic. The Sea Tech transmissometer employs a light emitting diode (LED) light source with a wavelength of 660 nm, which is in the red part of the spectrum. This LED is nearly monochromatic.

A beam attenuation coefficient, "c", can be divided into three parts: 1) That due to water,  $c_w$ ; 2) that due to suspended particulate matter,  $c_p$ ; and 3) that due to dissolved materials (mostly humic acids or "yellow matter"),  $c_y$ . Hence,  $c = c_w + c_p + c_y$ . Each of these components has distinct spectral characteristics. Yellow matter absorbs strongly in the blue part of the spectrum. This absorption decreases exponentially with increasing wavelengths. The beam attenuation coefficient for particulate matter is much less wavelength dependent. It varies approximately as  $\lambda^{-1}$ . The attenuation spectrum of natural waters is a composite of the three components, depending on the relative concentrations. The yellow matter is a by-product of organic decay and can be present in large amounts in lakes, reservoirs, and near-shore waters. At 660 nm, the attenuation of yellow matter is negligible, however, so that the attenuation is due to particulate matter and sea water only.

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